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**SKETCH OF
THE EVOLUTION OF OUR
NATIVE FRUITS**



11

SKETCH OF THE EVOLUTION OF OUR NATIVE FRUITS

It would be curious to speculate as to what our pomology would have been if the civilization from which it, and we ourselves, have sprung, had had its birthplace along the southern shores of our great lakes, the northern of the Gulf of Mexico, and the intervening Mississippi, instead of the Levant, Mesopotamia and the Nile, and our old world had been open to us as a new world less than four hundred years ago.—*Asa Gray.*

BY
L. H. BAILEY
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IN MEMORY OF

Ernest Gustavus Lodeman

—DEAR FRIEND AND
ASSOCIATE—

I place this humble tribute

PREFACE

THREE motives run through this book: An attempt to expound the progress of evolution in objects which are familiar and which have not yet been greatly modified by man; an effort to make a simple historical record from unexplored fields; a desire to suggest the treasures of experience and narrative which are a part of the development of agriculture, and from which the explorer must one day bring material for history and inspiration for story.

It is now more than ten years since these studies were begun. Some of the material has been published in bulletins and journals, as indicated at intervals in the text; but the continuity of the effort and the full historical retrospect are first apparent in this book. The prosecution of the studies has demanded the consultation of original sources of information, when such have been accessible, and it has required much travel, including a visit to European herbaria in which the types of certain species of plants are deposited; and the necessity of these verifications has delayed the publication of the work two years after the completion of the manuscript. Yet, the book is only a sketch. The subject has little continuity or homo-

geneity of itself, and is not well adapted to monographic treatment. Therefore, no attempt is made to discuss all the native fruits which promise useful results to the cultivator. It is enough if it has been shown how the leading types now cultivated have come to be; and in the prosecution of these inquiries, the book is intended as a companion to "The Survival of the Unlike."

Naturalists and experimenters have long been impressed with the prospective importance of the great number of North American plants which afford edible parts or products. There is much literature on the subject; yet this writing is so fragmentary and scattered that the present importance of our native fruits, both as subjects of historical inquiry and as elements in our national wealth, is not appreciated by European writers. In support of this statement, I have only to quote these sentences from DeCandolle's "Origin of Cultivated Plants" (page 448): "A noteworthy fact is the absence in some countries of indigenous cultivated plants. For instance, we have none from the arctic or antarctic regions, where, it is true, the floras consist of but few species. The United States, in spite of their vast territory, which will soon support hundreds of millions of inhabitants, only yields, as nutritious plants worth cultivating, the Jerusalem artichoke and the gourds. *Zizania aquatica*, which the natives gathered wild, is a grass too inferior to our

cereals and to rice to make it worth the trouble of planting it. They had a few bulbs and edible berries, but they have not tried to cultivate them, having early received the maize, which was worth far more." And yet the American grapes have given rise to eight hundred domestic varieties, the American plums to more than two hundred, the raspberries to three hundred, and various other native fruits have a large cultivated progeny! Even Darwin's prophecy was largely fulfilled when he wrote it ("Variation of Animals and Plants," i., 329): "Had North America been civilized for as long a period, and as thickly peopled, as Asia or Europe, it is probable that the native vines, walnuts, mulberries, crabs and plums would have given rise, after a long course of cultivation, to a multitude of varieties, some extremely different from their parent-stocks; and escaped seedlings would have caused in the New, as in the Old World, much perplexity with respect to their specific distinctness and parentage."

The author must say, however, that his greatest satisfaction in the book is in the record of the men rather than in that of the fruits. Professed historical inquiry often confines itself within arbitrary bounds, not covering the whole sweep of human progress. The names which are generally known are those of persons who are distinguished in military operations, politics, general science, or literature; but persons

who have expended equal talent and effort in other and more restricted fields of activity may have wrought as much permanent good to mankind. The agricultural and industrial status of an epoch may be of greater importance to the progress of a people than the political complexion is. It is a question if the habit of dwelling upon a few very prominent names in a few fields of human endeavor does not tend to obscure the really fundamental movements and to distort historical perspectives. At all events, the writer is glad of the opportunity to give what prominence he may to persons who have rendered a service to the national welfare in fields which are little appreciated.

L. H. BAILEY.

MUNICH, GERMANY, April 15, 1898.

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SKETCH OF THE EVOLUTION OF OUR NATIVE FRUITS

I

THE RISE OF THE AMERICAN GRAPE

NORTH AMERICA has given the world a new fruit in its grapes. The grape of Europe and of history has always led a precarious existence when introduced into our eastern states, and it is now wholly supplanted in this region by the ameliorated offspring of the native species. This American grape is much unlike the European fruit. It is essentially a table fruit, whereas the other is a wine fruit. European writings treat of the vine, but American writings speak of grapes. This difference in names records a true unlikeness between the fruits, for a fruit which is eaten from the hand leaves the impress of itself upon the mind, but one which is crushed and passed into wine leaves only the impress of the vine and the vineyard. But the early American writings also treated of the vine and wine, and it was not until the middle of the present century that the modern table use of the native grape began to be appreciated and understood. It will be interesting to trace the progress of this curious evolution.

North America is a Natural Vineland

The first record of America is also a record of its grapes. Leif, son of Eric, the old Norse navigator, touched our northeastern shores in about the year 1000. "Farther south and westerly they went," says Justin Winsor's narrative, "and going up a river came into an expanse of water, where on the shores they built huts to lodge in for the winter, and sent out exploring parties. In one of these, Tyrker, a native of a part of Europe where grapes grew, found vines hung with their fruit, which induced Leif to call the country Vineland." The English colonists found the coasts of what is now New England to be profuse in grapes. In 1621, Edward Winslow wrote that "here [in New England] are grapes, white and red, and very sweet and strong also." In 1630, Francis Higginson said that "excellent Vines are here up and downe in the Woods. Our Governour hath already planted a Vineyard with great hope of encrease." Thomas Morton, in his "New English Canaan," an account of New England in 1632, wrote as follows: "Vines, of this kind of trees, there are that beare grapes of three colours, that is to say: white, black and red. The Country is so apt to vines, that (but for the fire at the spring of the yeare) the vines would so over spreade the land, that one should not be able to passe for them, the fruit is as bigg of some; as a musket bullet, and is excellent in taste." The Massachusetts colonists made wine of the native grapes during their first summer, but Edward Everett Hale remarks that "the appetite for such wine does not seem

perilous." Governor's Island, in Boston Harbor, was granted to Governor Winthrop in 1632, upon the condition that he should plant a vineyard or orchard upon it; and in 1634 the yearly rent was a hogs-head of wine.

England, however, is not a wine-making country. The vine is there grown laboriously upon walls and under glass, to rescue it from the uncongenial coolness of the summers. So the New Englanders appear not to have given great attention to wine-making, either from the native grape or from plantations of introduced vines. Then, the summers are too short and the winters too severe to give much encouragement to the growing of the vine for wine-making in New England, and we must look farther south for the early evolution of the American grape.

The Spanish colonists in Florida were attracted by the wild grapes. John Hawkins, an English captain, visited these settlements in 1565, and said that twenty hogsheads of wine had been made in a single season, and he speaks of the wild grapes, which "taste much like our English grapes." The intrepid French adventurers and colonists were everywhere attracted by the abundance of grapes, and we find accounts of their wine-making far in the interior country. In 1769, the French settlers at Kaskaskia, in southern Illinois, made 110 hogsheads of wine from wild grapes. Even as far north as Michigan, these *voyageurs* found the banks of the streams festooned with the vines and the purple fruits hanging in wild abandon in the rich September sun. Over a hundred years ago, a party of these explorers pushed up a river in southern Michigan and, noticing the

grapes, cried out, "Le raisin ! Le raisin !" (the grape, the grape), and they called the stream "La rivière au raisin," and it is known as River Raisin to this day.

In the middle Atlantic region, the native grape also attracted much attention from the colonists and travelers. Captain John Smith saw in Virginia, in 1607-9, as he relates, "Of vines, great abundance in many parts, that climbe the toppes of the highest trees in some places, but these beare but fewe grapes. But by the rivers and Savage habitations where they are not overshadowed from the sunne, they are covered with fruit, though never pruned nor manured. Of those hedge grapes, wee made neere 20 gallons of wine, which was neare as good as your French British wine, but certainly they would prove good were they well manured. There is another sort of grape neere as great as a Cherry, this they [the Indians] call *Messaminnes*; they bee fatte, and the iuyce thicke: neither doth the tast so well please when they are made in wine."

In 1648, Beauchamp Plantagenet, in his quaint account of "New Albion," describes "Uvedale under Websneck" (a part of Delaware) as "a valley sixe miles long, sheltered by hils from the North-west windes: below it is sixe miles a thicket of four sorts of excellent great Vines running on Mulberry and Sassafras trees; there are four sorts of Grapes, the first is the Thoulouse Muscat, sweet sented, the second the great foxe and thick grape, after five moneths reaped being boyled and salted, and well fined, it is a strong red Xeres; the third a light Claret, the fourth a white Grape creeps on the land, maketh a pure

GOLD colour white wine: *Tenis Pale* the French man of these four made eight sorts of excellent wine, and of the Muscat acute boyled that the second draught will fox [intoxicate] a reasonable pate four moneths old: and here may be gathered and made two hundred tun in the Vintage Moneth, and re-planted will mend." These grapes which Plantagenet saw, were undoubtedly native to the country; for although he uses the name Muscat, it must be remembered that this word, and such other foreign names as Madeira and Tokay, were freely applied to wild varieties which bore a general resemblance to European varieties having these names. One of the significant parts of this account is the use of the verb *to fox* for "intoxicate." The term fox-grape was evidently applied to various kinds of native grapes in the early days, although it is now restricted to the *Vitis Labrusca* of the Atlantic slope. Several explanations have been given of the origin of the name fox-grape, some supposing that it came from a belief that foxes eat the grapes, others that the odor of the grape suggests that of the fox—an opinion to which Beverley subscribed nearly two centuries ago—and still others thinking that it was suggested by some resemblance of the leaves to a fox's track. William Bartram, writing at the beginning of this century, in the Medical Repository, is pronounced in his convictions: "The strong rancid smell of its ripe fruit, very like the effluvia arising from the body of the fox," "gave rise to the specific name of this vine, and not, as many have imagined, from its being the favourite food of the animal; for the fox (at least the American species) seldom eats grapes or other fruit if

he can get animal food." I am inclined to suggest, however, that the name may have originated from the lively foxing or intoxicating qualities of the poor wine which was made from the wild grapes.* At the present day, we speak of "foxiness" when we wish to recall the musk-like flavor of the wild *Vitis Labrusca*; but this use of the term is of later origin, and was suggested by the name of the grape.

"A Perfect Description of Virginia," a narrative "sent from Virginia, at the request of a Gentleman of worthy note, who desired to know the true State of Virginia as it now stands," but published anonymously in 1649, records: "Vines in abundance and variety, do grow naturally over all the land, but by the birds and beasts, most devoured before they come to perfection and ripenesse; but this testifies and declares, That the Ground, and the Climate is most proper, and the Commodity of Wine is not a contemptible Merchandize; but some men of worth and estate must give in these things example to the inferior inhabitants and ordinary sort of men, to shew them the gain and Commodity by it, which they will not believe but by experience before their faces."

Robert Beverley, who wrote a "History of Virginia" in 1722, gives a very explicit account of the products of the country. "Of the natural productions and conveniences of Virginia in its unimprov'd state, before the English went thither," he has the following to say upon the vine: "Grapes grow there in an incredible Plenty, and Variety; some of which are very sweet

*The following entry in Pepys's Diary (vol. i. p. 82; 1659) shows that *to fox* meant to get drunk: "He went with me to my office, whither also Mr. Madge comes half foxed and played the fool upon the violin that made me weary."

and pleasant to the taste, others rough and harsh, and, perhaps, fitter for Wine or Brandy. I have seen great Trees covered with single Vines, and those Vines almost hid with the Grapes. Of these wild grapes, besides those large ones in the Mountains, mention'd by *Batt* in his Discovery, I have observed four very different Kinds, *viz.*

"One of the Sorts grows among the Sandbanks, upon the Edges of the low Grounds, and Islands next the Bay, and Sea, and also in the Swamps and Breaches of the Up-lands. They grow thin in small Bunches, and upon very low Vines. These are noble Grapes; and tho' they are wild in the Woods, are as large as the *Dutch* Gooseberry. One Species of them is white, others purple, blue, and black, but all much alike in Flavour, and some long, some round.

"A second Kind is produced throughout the whole country, in the Swamps and Sides of Hills. These also grow upon small Vines, and in small Bunches; but are themselves the largest Grapes as big as the *English* Bullace, and of a rank Taste when ripe, resembling the smell of a Fox, from whence they are called Fox-Grapes. Both these Sorts make admirable Tarts, being of a fleshly Substance, and perhaps, if rightly managed, might make good Raisins.

"There are two Species more, that are common to the whole Country, some of which are black, and some blue on the out-side, and some white. They grow upon vast large Vines, and bear very plentifully. The nice Observer might, perhaps, distinguish them into several Kinds, because they differ in Colour, Size, and Relish; but I shall divide them only into two; *viz.* the early, and the late ripe. The

early ripe common Grape is much larger, sweeter, and better than the other. Of these some are quite black, and others blue, and some white or yellow; some also ripen three Weeks, or a Month before the other. The Distance of their Ripening, is from the latter End of *August*, to the latter End of *October*. The late ripe common Grapes are less than any of the other, neither are they so pleasant to the Taste. They hang commonly till the latter End of *November*, or till *Christmas*; all that I have seen of these are black. Of the former of these two Sorts, the *French* Refugees at the *Monacan* Town made a sort of Claret, tho' they were gathered off of the wild Vines in the Woods. I was told by a very good judge, who tasted it, that it was a pleasant, strong, and full bodied Wine. From which we may conclude, that if the Wine was but tolerably good, when made of the Wild Grape, which is shaded by the Woods from the Sun, it would be much better, if produc'd of the same Grape cultivated in a regular Vineyard."

Jean Pierre Purry speaks of the abundance of wild grapes in South Carolina, in his description of that province, written in French, published in 1731: "The woods are full of wild Vines, bearing 5 or 6 sorts of Grapes naturally; but for want of Vine-dressers, &c. scarce any Wine is drank there but what comes from Madera, which are indeed cheap, for a bottle of excellent Wine cost last Winter but 2s. *Carolina* Money to those who bought it by the Hogshead." William Bartram, traveling in north-western Florida in 1776, found the trees and bushes "entangled with grape vines (*Vitis campestris*) of a

peculiar species ; the bunches (racemes) of fruit were very large, as were the grapes that composed them, though yet green and not fully grown [the middle of July], but when ripe are of various colours, and their juice sweet and rich. The Indians gather great quantities of them, which they prepare for keeping, by first sweating them on hurdles over a gentle fire, and afterwards dry them on their bunches in the sun and air, and store them up for provisions : these grape vines do not climb into high trees, but creep along from one low shrub to another, extending their branches to a great distance horizontally round about, and it is very pleasing to behold the clusters pendant from the vines, almost touching the earth, indeed some of them lie upon the ground."

Early Attempts to Cultivate the European Grape

It is not necessary to extend this inquiry of the early records of the native grapes: Numerous quotations could be made from the early narrators. It is enough to know that these fruits grow wild in the greatest profusion in the wooded parts of North America from the Great Lakes to the Gulf and from ocean to ocean. It is more to our purpose to inquire if the European vine (*Vitis vinifera*) was introduced into the country and what the outcome was.

It was early conceived that wine-making must be a profitable business in the New World because of the cheapness of the land ; and the opinion was no doubt strengthened by the fact of the profusion of wild grapes, for these betokened a climate congenial to the vine. The first concerted attempt to cultivate

the European or wine grape in North America seems to have been that of the London Company, in 1621 and 1622. The Company was then under the directorship of the Earl of Southampton. In a letter from the Company to the colonial authorities, dated the 12th of August, 1621, and sent by the ship *Marmaduke*, is the following information: "Since the conclusion of our letter we have received from his Ma'tie a Petition exhibiting unto him by certain ffrenchmen and Walloones Desires to inhabite in Virginia: we have considered of these propositions and have returned them so fine an answer as wee consider they will resolve to go, they wilbe 60 families, consisting of about 300 persons, you may expect them cominge about the next spring. We hope they wilbe a great strength to the Collony."

In a letter of September 21st, of the same year, sent by the ship *Warwick*, it is recorded that "there are two French youths now sent to Capt. Tho. Nuce, part of those ten promised him the next Springe." This letter also mentions the sending of silk-worm eggs and grape vines: "By the Dutie wch about the middle of next month is to depart we hope you shall receive full sattisfaccon [i. e. the answering of certain questions]; wch Shipp shall bring with her store of silke worrne seed and abundance of vine plants, for both wch we desire not only that generall pperations be made, but that timely notice and order be given throughout the whole colony, that every pticuler man may make prouision for the receiuinge of some quantitie of them both, and that a straight charge be giuen for the pserving of vines and mulberry trees, wch we understand with others are promiscuously

defrayed; and because the skill of handling them is only deriued from the Frenchmen we canot but here recomend this to yo^r fauo^r and regard that they may be kindly used and cherished." The letter also represents that supplies were furnished for the Frenchmen and Dutchmen (the latter having been sent to erect saw-mills). The supplies were "diuers provisions of victualls as also a cloth to make them apparrell; for hose and shoes and other such matters we desire they may be supplied by the Companies stock there, out of the Magazine wch now comes along in the Warwicke large and abundante in all usefull and necessarie comodities."

It is evident from this narrative that the London Company desired to introduce the cultivation of the vine into Virginia and that it encouraged the immigration of the French for that purpose. The experiment seems to have come to naught, however. Beverley, writing a hundred years later, speaks of the attempt as follows: "The Year before the Massacre, Anno 1622, which destroy'd so many good Projects for *Virginia*; some *French* Vignerons were sent thither, to make an Experiment of their Vines. These People were so in Love with the Country, that the Character they then gave of it, in their Letters to the Company in *England*, was very much to its Advantage, namely, 'That it far excell'd their own Country of *Languedoc*: The Vines growing in great Abundance and Variety all over the Land: That some of the Grapes were of that unusual Bigness, that they did not believe them to be Grapes, until by opening them, they had seen their Kernels: That they had planted the Cuttings of their Vines at *Michælmas*, and had Grapes

from those very Cuttings, the Spring following. Adding in the Conclusion, that they had not heard of the like in any other Country:’ Neither was this out of the Way, for I have made the same Experiment both of their natural Vine, and of the Plants sent thither from *England*.” There appears to be some anachronism here, for there is no record of any Frenchmen having arrived, save the two boys, in 1621. They were expected to arrive “about the next spring.” The massacre occurred on the 22nd of March, 1622. It is probable that Beverley is in error in attributing the termination of the grape experiment to the massacre; but it is enough for our purpose to know that nothing of permanent value came of the enterprise. It is said, however, that in 1651, premiums were offered for wines of domestic manufacture. In Berkeley’s time “some Vineyards” had been attempted, “and one is brought to perfection, of 750 Gallons a Year. The Wine drinks at present greenish, but the Owner doubts not of good Wine, in a Year or two more, and takes great Delight that Way.”

We have already seen that John Winthrop, Governor of the Massachusetts Bay, started a vineyard in one of the islands in Boston Harbor. This island came to be early known as “The Governour’s Garden.” The rent fixed for this favored spot by the General Court, in 1634, was “a hogshead of the best wyne that shall grow there to be paide yearly” after the death of Winthrop. The Massachusetts Company sent to the colony, in 1629, “vine-planters, wheat, rye, barley, oats, a hogshead of each in the ear: beans, pease, stones of all sorts of fruits, as peaches, plums, filberts, cherries: pear, apple, quince

kernels;" and the consignment is said to have included pomegranates, currant plants, potatoes, and other plants. The experiments with the vines seemed to have come to nothing. Apparently the earliest plantation of vines made on the New England coast, was that at the mouth of the Piscataqua, on the borders of the present state of Maine. This settlement was made in 1623, but in 1630 Ambrose Gibbons, agent of Mason and Gorges, settled there for the purpose of founding a plantation, according to Slade, "to cultivate the vine, discover mines, carry on the fisheries, and trade with the natives." The planted vines failed, but "them that grow naturally" were reported to have been "very good of divers sorts." Probably every important settlement in what is now New England made an especial effort to grow the grape. There are frequent references to such attempts in the early records of the colonies. But all of them sooner or later failed, and we shall not, therefore, pursue the history further.

Following the revoking of the Edict of Nantes, in 1685, by Louis XIV., many Huguenots sought refuge in America. They settled chiefly in the Carolinas and Georgia, and they brought with them the French love for vine-culture and wine. They made many attempts at vine-growing, but with no permanent success; yet the efforts kept the subject before the public mind, and out of the failures there finally came a type of grapes which persists to this day. The attempts were repeated until well into the present century, however, always with poor or indifferent success. About 1800, one Magget is recorded to have obtained a grant of money from the legislature of South Carolina for the

purpose of extending the planting of grapes in that colony.

The trustees of the colony of Georgia early made attempts at the cultivation of the vine in Georgia. One of the famous efforts of those days was that of Abraham De Lyon, who, under the encouragement of the Trustees, procured vines from Portugal and planted them in his garden in Savannah. Jones, in his "History of Georgia," makes the following quotation from Colonel William Stephens, "as presenting the only picture of a Georgia colonial vineyard which has been handed down to us."

"Tuesday, December 6th, 1737. After dinner walked out to see what Improvement of Vines were made by one Mr. Lyon a *Portugese Jew*, which I had heard some talk of; and indeed nothing had given me so much Pleasure since my Arrival as what I found here; though it was yet (if I may say it properly), only a Miniature, for he had cultivated only for two or three Years past about half a Score of them which he received from Portugal for an Experiment; and by his Skill and Management in pruning &c., they all bore this Year very plentifully a most beautiful, large Grape as big as a Man's Thumb, almost pellucid, and Bunches exceeding big; all which was attested by Persons of unquestionable Credit (whom I had it from) but the Season now would allow me only to see the Vines they were gathered from, which were so flourishing and strong that I saw one Shoot, of this last Year only, which he allowed to grow from the Root of a bearing Vine, as big as my Walking-Cane, and run over a few Poles laid to receive it, at least twelve

or fourteen Foot, as near as I could judge. From these he has raised more than a Hundred, which he has planted all in his little Garden behind his House at about four Foot Distance each, in the Manner and Form of a Vineyard: They have taken Root and are about one Foot and a half high; the next Year he says he does not doubt raising a Thousand more, and the Year following at least five Thousand. I could not believe (considering the high Situation of the Town upon a Pine Barren, and the little Appearance of such Productions in these little Spots of Ground annexed to the House) but that he had found some proper Manure wherewith to improve the sandy Soil; but he assured me it was nothing but the natural Soil, without any other Art than his Planting and Pruning which he seemed to set some Value on from his Experience in being bred among the Vineyards in *Portugal*; and, to convince the World that he intends to pursue it from the Encouragement of the Soil proving so proper for it, he has at this Time hired four Men to clear and prepare as much Land as they possibly can upon his forty-five Acre Lot, intending to convert every Foot of the whole that is fit for it into a Vineyard: though he complains of his present Inability to be at such an expense as to employ Servants for Hire. From hence I could not but reflect on the small Progress that has been made hitherto in propagating vines in the publick Garden where, the Soil being the same, it must be owing to the Unskilfulness or Negligence of those who had undertaken that Charge."

But the attempt soon failed. William Bacon Stevens, in his "History of Georgia," writes that

"the wine which was to supply all the plantations, and to cultivate which they had employed a vigneron from Portugal, and planted in their gardens the choicest cuttings from Madeira, resulted in only a few gallons, and was then abandoned."

One of the most enterprising and intelligent early cultivators of the grape in this region was Nicholas Herbemont, of Columbia, South Carolina, whose name is now given to one of the best wine grapes of the South. As late as January, 1828, he opens a series of articles in the *Southern Agriculturist*, upon the cultivation of the grape for wine, but among the varieties which he chooses are derivatives of American species, like Herbemont, Le Noir, Bland's Madeira, Isabella, and the like.

It is said that Paul Richards, of the city of New York, entered upon the cultivation of the wine grape on a large scale some two hundred and fifty years ago, and in 1664, Nicolls, the first English governor of New York, granted Richards the privilege of making and selling wine free of impost, and ordered that all persons setting vines within the next thirty years should pay Richards a tax of five shillings for every acre planted. William Penn planted a vineyard near Philadelphia in 1683, the year following his coming to America. Andrew Dore made an attempt near by two years later. Many other attempts to grow the European grape were made in various parts of the country, but none seem to have been successful.

Yet the interest in vine-growing persisted. In 1769, Edward Antill, of Monmouth, New Jersey, wrote the first American treatise upon the vine. It was published in the *Transactions of the Philosophical*

Society for 1771, and it covers over eighty quarto pages. Antill seems to have been inspired with a patriotic devotion to the welfare of his country, and his treatise bears the marks of that broad and prophetic vision which is so characteristic of the latter part of the last century. "Nothing but the love of my country and the good of mankind," he writes, "could have tempted me to appear and expose myself to public view." "When I first undertook a vineyard," he explains, "I can without the least spark of vanity say, I did it for the good of my country, and from a principle of love to mankind; I consider that too many of the people of America were unhappily drawn into great excesses in the use of distilled spirituous liquors, which ruin their constitutions, and soon render them unfit for the service of God and their country, as well as for that of their own family and friends. Wine, on the contrary, is a more homogeneous liquor, more wholesome, and much better adapted to the spirit, and constitution of man; and although men will run into excesses in the use of it, yet it works itself off better, and does not destroy the natural vital heat and animal spirits, in so great a degree and in so sudden a manner, as fiery, distilled liquors do; for these reasons I went on, and endeavoured to make myself master of the subject, and by many experiments to satisfy myself of the truth of things." It was Antill's ambition, then, to grow grapes for wine and not for eating. His treatise is founded largely upon European practice, and there is only the most meager reference to any American experience. He still quotes Columella. He says in his introductory letter that the industry is "yet new to America, though

an undertaking as antient at least as the days of Noah." There is other evidence that the undertaking had received little close attention, for he knows very few natural enemies of the crop, a condition of things which could not have existed if the vine had been an important subject of cultivation. The first enemy to the vineyard is "people of every age and sex," especially the "rude and unthinking sort," which "take all advantages of your absence or neglect at the time of the fruit's beginning to grow ripe, to rob and pilfer." These persons "must be carefully guarded against, by a good, close, high fence without, and a smart, watchful dog within, and especially by the vigneron's appearing now and then with a gun in his hand, walking about his vineyard in an evening." He then mentions birds, some of which "give you a fine song for your fruit;" wasps, which pierce the grapes "in several places, with their sharp-pointed bills;" "a short, smooth earth worm," or grub, which "often cuts off the choicest branches" of young vines near the surface of the ground; and finally, there were "vine fretters," which are "very small animalculæ, or insects," which "appear in great numbers, in mere clusters, upon the young, tender branches, upon the juice of which they feed." Antill devotes much space to the making of wine, and the varieties which he recommends were all of the European stock. Antill is mentioned by S. W. Johnson as "a gentleman who cultivated the grape with sedulous attention," and he made wine and shipped some of it to England.

Johnson wrote the second popular treatise on the vine which has come down to us. It is a "book" or chapter, "On the Cultivation of the Vine," com-

prising forty-three pages in the authors' "Rural Economy," published at New Brunswick, New Jersey, in 1806.* He drew heavily from the experiences and writings of Antill. He mentions the four enemies of grape-growing which are described by Antill, and adds remarks upon the mildew and hail, and rejoices that such terrible European pests as the snail, gribouri, and beche—"which no art has yet been found adequate to conquer"—have not yet reached America. In his time, the former seat of Antill was occupied by Miles Smith, who had "a large and handsome vineyard." But the chief interest which Johnson's account has to us is the eulogium which he pronounces upon Peter Legaux, a vine-grower at Spring Mills, thirteen miles northwest of Philadelphia. Legaux appears to have been the most intelligent and public-spirited grape-grower which the country had known; and he was the person who introduced—though unknowingly—the grape which ushered in the distinctive American viticulture. We shall hear more of Legaux in the following pages, and we shall pause now only to read Johnson's praise of him. Our author speaks of his application to "the philanthropic M. Legaux" for information on the grape, and then proceeds: "The liberality with which M. Legaux gave answers to his correspondent, through the medium of the public papers, for the benefit of the public; the botanico meterological observations made for fifteen years successively, drawn out on purpose to answer the questions proposed, and also published for gen-

*Johnson's pictures of grape training are reproduced in "Pruning-Book," pp. 391, 392.

eral information; the extensive usefulness of that gentleman in having in 1801 supplied Kentucky with fifteen hundred cuttings, Pennsylvania with fifteen hundred, and other quantities to vineyards established in Connecticut, New-York, New-Jersey, Maryland, Virginia, and the State of Ohio, from which numerous branches have since issued, awake fresh sentiments of respect for so useful a character. Such men merit a token of respect from every state in the Union."

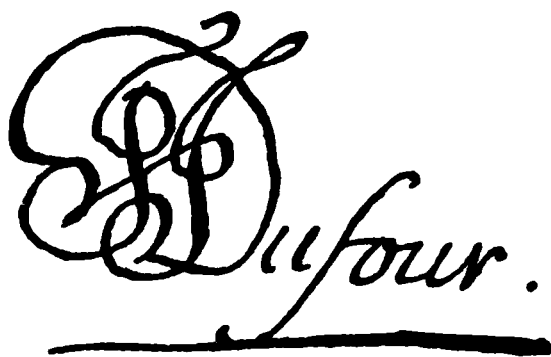
The attempt to grow the Old World wine grapes out of doors in eastern America was continued until twenty-five or thirty years ago; in fact, the effort is even now made by an occasional amateur. Nicholas Longworth—of whom we shall yet have much to say—wrote, in 1845, of his endeavors in this direction: "I have for thirty years experimented on the foreign grape, both for the table and for wine. In the acclimation of plants, I do not believe; for the White Sweet Water does not succeed as well with me, as it did thirty years since. I obtained a large variety of French grapes from Mr. Loubat, many years since. They were from the vicinity of Paris and Bordeaux. From Madeira, I obtained six thousand vines of their best wine grapes. Not one was found worthy of cultivation in this latitude, and were rooted from the vineyards. As a last experiment, I imported seven thousand vines from the mountains of Jura, in the vicinity of Salins, in France. * * * But after a trial of five years, all have been thrown away. * * * If we intend cultivating the grape for wine, we must rely on our native grapes, and new varieties raised from their

seeds. If I could get my lease of life renewed for twenty or thirty years, I would devote my attention to the subject, and I would cross our best native varieties with the best table and wine grapes of Europe."

It is unnecessary to rehearse other attempts to grow the foreign grape in eastern America. All efforts eventually resulted in failure. The experiment has been tried upon an extended scale by many expert men for a period of over two centuries. We shall, therefore, consider the history of another line of endeavor, leaving the curious reader in ignorance, for the time being, of the causes of all these disasters.

The First Experiment of the Dufours

A great and well-laid attempt was finally made, in Kentucky and Indiana, to establish the wine grape in America, the results of which were the most far-reaching of any single experiment. The leader of this movement was John James Dufour, a Swiss. When a lad, he conceived that America offered a field in which to engage in wine-making with profit. Later in life he was imbued with the feeling which was so well expressed by Antill, and which has been held by many another since, that good wine will expel the stronger liquors. "Then that offspring of fire—distilled liquor—so corrosive and acerb as its parent," he writes, "which crisps the heart and maketh man mad, will be left for the poor inhabitants of frozen coun-



tries, to whom both grapes and apples have been refused; and if this my humble performance, should contribute to bring such blessings in the country, I could rejoice to have quitted my first home to come here." Dufour recites the reasons for his coming to America in his "Vine Dresser's Guide," which was published in 1826: "When I took the resolution to come to America, to try the cultivation of the grape I was but fourteen; and I came to this determination by reading the papers, which were full of the American Revolutionary War, and contained many letters from the officers of the French army aiding the Republicans, which complained of the scarcity of the wine among them, in the midst of the greatest abundance of everything else; and by inspection of the maps, I saw that America was in the parallel of the best wine countries in the world—like Spain, South of France, Italy and Greece; I then made the culture of the grape, of its natural history, and of all that was connected with it, my most serious study, to be the better able to succeed here. It is that resolution which made me a vine dresser, although some may think I am not fit for it, being maimed in my left arm. It was it, which made me lose several chances of getting rich, in my journeying through America, because it had so completely absorbed all my other thoughts; and it was also that resolution, which made me accept a proposal of an association for the culture of the grape in Kentucky."

The Dufour family has particular interest to us, for the outcome of this experiment has had a most important bearing upon American viticulture. John James Dufour, the father of the subject of our sketch,

lived in the commune of Chatelard, District of Vevay, Canton de Lemau (now de Vaud), Switzerland. The family was French. By a first marriage he had two sons, John James, Jr., and Daniel. By a second marriage, there were six children, Jeane Marie, Antoinette, John Francis, Susannah Margareta, John David, and Aimé. John James Dufour, the son, married in Switzerland, and had one son, Daniel Vincent, but the wife never came to America. The project of a great grape commune was talked over and perfected in the family circle in Switzerland, and finally every son and daughter of the family, the grandson, and a few associates, cast their lots in the wilderness of the New World to work out a livelihood for themselves and a mission for mankind. Without further mention of the father and mother in the home nest in Switzerland, we will now follow the fortunes of John James, the eldest son, and of his associates.

John James Dufour, Second, the founder of the colony, set off for America in March, 1796. He took the brig "Sally" for Philadelphia on June 10, and landed in the New World August 12. He paid \$50, beside baggage charges, for his passage. For two or three years, Dufour set himself to preparation for his future work by visiting all the leading vineyards in the country, going as far west as the French settlements at Kaskaskia. He visited the estate of Jefferson, at Monticello, in 1799, and found that the vine "had been abandoned, or left without any care for three or four years before, which proved, evidently, that it had not been profitable." There was a vineyard on the estate of Mr. Carroll, at Carrollton, below Baltimore, where, in 1796, "they had tried a few sorts

of the indigenous grapes." Near the Susquehanna River, "not far from Middletown," was a neglected vineyard which had been planted by a German, then deceased, but which "had produced some wine." "At the Southern Liberties of Philadelphia" Dufour saw a vineyard in 1806 "of a large assortment of the best species of French grapes." These were two and three years planted, and were still healthy. At Kaskaskia, on the Mississippi, he "found only the spot where that vineyard had been planted in a well selected place, on the side of a hill to the north-east of the town, under a cliff. No good grapes, however, were found either there, or in any of the gardens of the country. A thick forest was covering that spot, with a luxuriant undergrowth, and of asparagus in the place where the Jesuits had planted a bed of that vegetable."

Dufour had found, in his journey down the Ohio, a Frenchman at Marietta "who was making several barrels of wine every year, out of grapes that were growing wild, and abundantly, on the heads of the Islands of the Ohio River, known by the name of Sand grapes, because they grow best on the gravels;" and some of the wine made from the indigenous grapes, when four months old, was "like the wine produced in the vicinity of Paris, in France, if not better." The French settlers were convinced, however, that these grapes were not natives, but that they were derived from the old French stock at Fort Duquesne, for the French are said to have rooted up their vines and thrown them into the river when the English took the fort. There seems to have been the strongest prejudice against the native grapes, a feeling which Dufour shared, as we shall presently see.

But the most interesting vineyard which this indefatigable explorer found was that at Spring Mill, on the Schuylkill, near Philadelphia. This was planted by the Frenchman, Peter Legaux—whom M'Mahon calls "a gentleman of worth and science"—but about the close of the century it was taken up by "a wealthy Society formed by subscription," in Philadelphia, and incorporated by the legislature of Pennsylvania "for the promotion of the culture of the vine." The secretary of this Society was the excellent Bernard M'Mahon, author of the "American Gardener's Calendar," and whom every botanist and nurseryman recalls in the *Mahonia* barberries.

Of all the vines which Dufour saw, none sufficed "to pay for one half of their attendance" save the "vines planted in the gardens of New York and Philadelphia, and about a dozen of plants in the vineyard of Mr. Legaux." And from these few plants of Legaux's, under Dufour's care, began the most important experiment in American grape culture.

Dufour was now ready to locate land and to establish the proposed grape colony. He chose a location in the Great Bend of the Kentucky River, about twenty-five miles from Lexington by the present pikes, and thirteen miles from the present village of Nicholasville. "The Kentucky Vineyard Society" appears to have been established under his inspiration. He says that it was "an association for the culture of the grape in Kentucky, under the same principles of the one established at Philadelphia, though not knowing, however, which of those societies had been the first." This organization "may be with great propriety considered as the beginner, the true introducer of the

cultivation of grape vines into the United States; although it proved to be a ruinous affair, both to the shareholders and their vine dresser—nevertheless millions will accrue to the country at large, from the school made there.” Dufour mentions himself as one of the “losers in that undertaking;” and he says that when he “first came to Lexington,” he was solicited to make “a trial on the cultivation of the grape,” but “was left with little courage by what I had seen done.” “They offered to help,” and a scheme of operation was completed. The planting at Spring Mill, near Philadelphia, was made earlier, for Dufour “saw that Vineyard in 1796, 1799, and 1806,” but the association which finally took it in charge seems to have been formed in 1798 or 1799. The Kentucky association must have been organized in 1798, for in January, 1799, Dufour went to Philadelphia and procured, for the Kentucky place, 10,000 grape vines and some fruit trees. These, including the transportation to Pittsburg, cost \$461. Spooner, however, states in his grape book in 1846, that “in 1793, Peter Legaux, a French gentleman, obtained of the legislature of Pennsylvania the incorporation of a company for cultivating the vine,” and that “for one year only prospects were favorable; but divisions and dissensions arose, and the stockholders sold out in disgust, and the vineyard went to ruin.” But Dufour saw the vineyard in 1806, and he bought vines there in 1799, so that Spooner’s chronology is open to doubt.

The Kentucky association was organized with \$10,000 capital. There were 200 shares at \$50 each, and forty shares were given Dufour as “salary to conduct the business, until it would become productive.” The

land was purchased of William Hazelrigg, who patented it from the government on or about 1785. When the vineyard should come into bearing, Dufour was to receive \$1,000 a year out of the produce, or nothing if there should be no produce. The 160 remaining shares were to be appropriated as follows:

For 633 acres of land	\$633 00
For 5 families of negroes	5,000 00
For tools, victuals, and other support . . .	1,000 00
Expenses of getting vine scions	800 00
Incidental expenses	567 00
	<hr/>
	\$8,000 00

The full number of shares was not taken, and the concern set out in the spring of 1799 with five acres planted to thirty-five varieties, many or most of which were obtained from Legaux.

The affair being now fully on its feet, the remaining members of the Dufour family were ready to join the enterprise. On New Year's Day, 1801, the adventurers came together in Switzerland, and prepared to take leave of home and country. Seventeen souls set sail in early spring upon a voyage which lasted 100 days. They landed in Norfolk in May. In this company were the seven remaining Dufours, Jean Daniel Mererod (who, either in Europe or America, married Antoinette Dufour), Francis Louis de Siebenthal, John Francis de Siebenthal and Philip Bettens, together with women and children. They crossed the Alleghanies to Pittsburg with wagons, the women and children who could not walk, going as freight, at so much per hundred pounds. At Pittsburg, the colonists took boats on the Ohio, and set their faces toward that wild and

rugged country which had been so recently the theater of Daniel Boone's adventures.

The party arrived at the vineyard on the 6th of July, 1801. There the colonists, fresh from the snug and well-tilled fields of Switzerland, saw a raw river bottom, rolling gradually up to rocky and wooded hills, which slope away to the south and southeast, and upon which the new vineyard was growing. In the foreground was a log cabin. But they were full of hope, and fell to work with much good-will. The brothers had brought grape vines from home, and these, with loving solicitude, were planted with the vines which had been procured in Philadelphia by the founder. "Three years we were in full expectation, and worked with great courage," writes John James Dufour; "—a great many species of vines showed fruit the third year; one vine of the Sweet Water was full of eminently good grapes, fully ripened by the first of September. A few bunches that I carried to Lexington, were admired beyond anything. But alas! it was the first and last year that that vine ever bore fruit, a sickness took hold of all our vines except the few stocks of Cape and Madeira grapes, from each of which we made the fourth year some wine, which was drank by the Shareholders in Lexington in March next."

A good contemporaneous account of the Dufour vineyard is given by the distinguished Frenchman, François André Michaux, who visited the place in August, 1802, in his second journey in America. "At fourteen miles from Lexington," he writes in his Travels, "I quitted the road to Hickman's ferry: I turned to the left, and lost myself in the middle of the woods,

so that I did not reach the vineyard until evening, where I was very politely received by M. Dufour, who directs the undertaking. He invited me to sleep there, and pass the following day with him, which I accepted." "The spot which he has selected and cleared is situated on the river Kentucky, twenty miles from Lexington. The soil is excellent, and the vines are planted on a small hill, with a steep declivity, exposed to the south, and the base of which is two hundred toises* from the river." "But his success is not equal to his attention: not more than four or five varieties are left, among which are those which he calls by the names of Burgundy and Madeira, and the first does not thrive well: the fruit always rots before it arrives at maturity. When I saw them, the bunches were few and stunted, the grapes small, and everything appeared as though the vintage of the year 1802 would not be more abundant than those of the preceding years. The Madeira vines, on the contrary, seemed to give some hopes: of a hundred and fifty, or two hundred plants, about a third were loaded with very fine grapes. These vines do not occupy a space of more than six acres; they are planted and supported by props, as in the environs of Paris. The vicinity of the wood attracts a species of bird, which is very destructive among them, and the nature of the country is a great obstacle to getting freed from them. Such was then the situation of this establishment, in which the proprietors took but a slight interest, and which was likely to meet with another hinderance in the division of M. Dufour's family, a part of which was on the point of quitting it to settle on the banks

*A toise is about $6\frac{2}{3}$ feet.

of the Ohio. These details are sufficient to give a very different idea of the state of the pretended flourishing vines of Kentucky, from that which may have been formed on the pompous accounts of them published some months ago in the public papers."

The subscribers to the vineyard company soon became disheartened and failed to meet their engagements, the available stock was used in paying for the labor which had been employed in the plantation, and the further prosecution of the enterprise rested upon three brothers Dufour, the other members of the colony having sought a new location on the banks of the Ohio, in Indiana. Every effort was made to increase the stock of the Cape and Madeira grapes, the only varieties which had escaped the fatal sickness. John James Dufour returned to Europe in 1806, and left the establishment in the hands of his younger brothers. In his absence the second war with England broke out, and he was delayed in returning until 1816. He found the "vineyard grown up with briars." The brothers had become discouraged, chiefly because one crop had been destroyed by a frosty spring, and "had abandoned the place to an American tenant, who supposed we had a bad title to the land." The intruder was ejected by due process of law. John James had appointed his half-brother, John Francis, his attorney on the 15th of January, 1806. The colony was at this time practically abandoned, although all the land did not pass out of the family until at least twenty-five years later. Upon returning to America, John James Dufour wrote "The American Vine Dresser's Guide, being a treatise on the cultivation of the vine, and the process of wine making.

Adapted to the soil and climate of the United States." Upon the title-page he speaks of himself as "formerly of Swisserland, and now an American citizen, cultivator of the vine from his childhood, and for the last twenty-five years occupied in that line of business, first in Kentucky, and now on the borders of the Ohio, near Vevay, Indiana." The book was printed in Cincinnati in 1826, by S. J. Browne. The author set out to distribute his book to friends in Kentucky, but took sick on the journey, and returned to the new settlement at Vevay, where he died early in 1827. John Francis Dufour resigned his office of Associate Judge in 1827, in order that he might give his attention to the administration of his brother's estate. In 1828, we find John James's son, Daniel Vincent, who had come to America when he reached his majority, selling seventy-five acres of the old vineyard tract to Michael Salter for two and a-half dollars an acre. The land was not deeded to Salter, however, until April 23rd, 1831, when he had paid a note which was given in partial settlement for the land. The land upon which the vineyard and buildings stood is now the property of George McQuery, whose grandfather is said to have procured it from the Dufours in 1828.

The traveler who visits the spot to-day finds an open glebe stretching from the Kentucky River to the hills (Fig. 3). Upon this lowland he will see a clump of bushes and poke-weeds, and a few stones (Fig. 4), marking the site of the old log house, which perished about 1845 to 1850. Near by is a broken and hollow pear tree (Fig. 5), three feet in diameter, which tradition says was brought from

Fig. 3. Site of "First Vineyard," Jessamine county, Kentucky as it looked in 1895.

Europe by the Dufours. This tree, which bears a Summer Bell pear, still gives an annual crop of its indifferent fruit. Just beyond is the hillside where the plantings were made, and the remnant of a stone wall marks one of the boundaries of the vineyard. The hillsides are covered with red cedars, with now and then a honey locust, and the open places support a bountiful crop of mulleins and teasels. The slopes are very rocky, the outcrop in lower levels being Trenton limestone, and in the higher courses the lower and middle Hudson sandstones. This hillside, where once the vine was planted with prophetic hope, is now a sheep pasture; and only tradition remains to recall the struggles and the disappointments of a noble band of pioneers whose labor, though fruitless to themselves, was fraught with blessings for the years to come.

Fig. 4. Site of the house at "First Vineyard," 1895.

The Second Experiment of the Dufours

Although wine had been made in the Kentucky vineyard for two or three years, it was evident to the colonists that the enterprise was doomed to failure. A fatal sickness had overtaken the vines. In 1802, certain of the colony sought a new location. Going down the Kentucky River to its mouth, they ascended the Ohio for a few miles, and chose the bottom of the rich and gently rising valley of what is now the

pretty little city of Vevay, Indiana. This spot is about 45 miles below Cincinnati. The colonists still held the vineyard in Kentucky, and cultivated it hopefully until 1804, and some of the party did not leave it even then. But all eyes were turned to the north.

The settlers not only thought that the new location was the better one for the grape, but tradition says that they chafed under the presence of slavery, and desired to escape it.

John James Dufour petitioned Congress to pass an act authorizing him and his associates to enter upon lands, with an extended credit, for the purpose of introducing the culture of the vine into the United States. Congress responded, and on May 1st, 1802,

Fig. 5. Old pear tree on site of "First Vineyard" plantation. 1895.

authorized them to select four sections of land on a credit of twelve years. The settlers selected 2,500 acres, and called the place New Switzerland. The country was a dense wilderness. There were very few settlers in the region. The first settler within

Fig. 6. City of Vevay, Indiana, 1895. The vineyards were planted on the bottom lands, where the city now stands. The old stone house of John Francis Dufour is seen (as a double building) in the foreground, toward the bottom of the hill, to the right of the two small barns. (See Fig. 9.)

the limits of the present county of Switzerland was Heathcoat Picket, who established himself there in 1795. The objects of the grant, as stated in the act, were "to plant the vine and make their principal business its cultivation." The parties to the covenant were John James Dufour, Daniel Dufour, John Francis Dufour, David Dufour, Aimé Dufour, Daniel Vincent

Dufour (son of John James), Jeane Marie Dufour, Antoinette Dufour, Susannah Margarita Dufour, Francis Louis de Siebenthal, John Francis de Siebenthal, Jean Daniel Mererod, and Philip Bettens. The lands at New Switzerland were divided into thirteen lots, to accommodate the different members of the colony. The method of division was as follows: "The said lands being on the Ohio River, and being surveyed diag-

Fig. 7. Jean Daniel Mererod. (Sketch made about 1825.)

onally with the River, it is agreed that each lot shall meet the River and its breadth upon the River shall be as follows: The most western or No. 1, 67 poles; No. 2, 65 poles; No. 3, 63 poles,

and so on". This decreasing width offset the increasing lengths towards the east. The 2,500 acres were in this manner divided into thirteen equal portions of a trifle over 192 acres each. The first lot, on the west, fell to Francis Louis de Siebenthal, No. 2 to Philip Bettens, No. 3 to Jean Daniel Mererod, and No. 4 to John Francis de Siebenthal. The remaining nine were allotted to the Dufours.

It was provided that "in order to indemnify the family of the Dufours of the cost and trouble they have been at (at least John James Dufour) by traveling in the United States to choose a convenient place of settlement, and presenting a petition to Congress, it shall be given him or family the sum of \$100 for each lot, to be paid before the 1st of January, 1812, diminishing six per cent unto the day of payment, upon the sum that shall have been paid before that time. As security of the said covenant each of us engages the whole of his property, present and hereafter, and in witness put his name and seal this 20th of January, 1803, at First Vineyard [Kentucky]."

It appears to have been in 1803 that the first settlement was made by the colony at New Switzer-

A handwritten signature in cursive script, reading "John F. Dufour". The signature is written in dark ink and is positioned centrally below the text of the settlement agreement.

land. John Francis Dufour is looked upon as the real founder and leader of this colony, although he did not remove there until 1809. He was a man of great enterprise and ability, and he left an indelible impress upon the people and institutions of Vevay, as

the colony of New Switzerland was afterwards and is at present called. He died June 6, 1850.

In this new location, the vines and fruit trees were planted on the bottom lands which slope gradually up from the Ohio. The labor of clearing the land and the haste for results were so great that the land was not plowed previous to the setting of the vines. "The Swissers on the borders of the Ohio," wrote John James Dufour, "having the ground to clear from a heavy forest of extraordinary big poplar [tulip-tree] and beech trees, and depending only on their own labor, did not prepare their ground according to the aforesaid rules, but satisfied themselves, by digging a hole for each vine the same as for any other tree, about twelve or fifteen inches in diameter, with the same depth, and it being filled with the top earth, they stuck the scion in the middle of it." "The first vineyard planted on the borders of the Ohio, was distanced six feet by two and a half feet, it has been worn out in sixteen years; on the spot, there is now [1826] young vines growing, since three years." The first wine at Vevay was made in 1806 or 1807. The vintage in 1808 was 800 gallons, and in 1809 about 1,200 gallons.

One of the best cultivators in the little colony was Jean Daniel Mererod (Fig. 7), whose wife was Antoinette Dufour. It was probably Mererod who made the first wine at the new settlement. His place may still be seen (Fig. 8), with the old wine cellar and the ponderous wine-press; and a few rods in front of it rolls the mighty torrent of the Ohio. At one place a grape stock persists, which, although cut off and abused year after year, still throws out its shoots

in memory of other days. In the year 1895, the writer partook of its fruit, which was clearly that of the Catawba; and so the vine could not have been one of the original plantation, as tradition asserts it to be. Aimé, son of the Mererods, a hale and reminiscent man of eighty years, is now (1895) the sole survivor of the grape-growing era of the colony. He lives at Vevay, where he is the oracle of local history.

Nearly a mile in the rear of the main thoroughfare which follows the river, and part way up the sharp declivity of the skirting bluff, the house of John



Fig. 8. Site of one of the original vineyards (Jean Daniel Mererod), at Vevay, 1895.

Francis Dufour still stands, in good repair (Fig. 9). The original house, which he built in 1809, was made of logs, and has perished, but the present structure was built in the very early days. A grandson of John Francis Dufour, and himself a gray-haired man, is now a prominent figure in Vevay.

Grape-growing, as a business, has long since perished at Vevay. The vines took sick and would not bear; or if they bore, the fruit rotted before it was ready for the harvest. Only one variety, known as the Cape grape, gave any important return. On the



Fig. 9. Stone house of John Francis Dufour, Vevay, Indiana. 1895.

27th of May, 1832 or 1833, a killing frost ruined most of the remaining vineyards, and the Catawba, which was justly becoming famous, was set in the place of the old varieties. But even this took the disease, and grape-growing there soon entered into a decline, from which it has never recovered.

John James Dufour's wife died, in Switzerland, in 1823. The half of her estate, which, by the laws of that country, fell to her son, David Vincent, was transferred to the father in exchange for the latter's property, which consisted of personal property, a town lot, 29 acres in one parcel and 605 acres in another in Vevay and neighborhood, and a half right, in partnership with John Francis Dufour, of keeping a ferry across the Ohio River. It is evident that John James Dufour intended to return to Switzerland to pass his declining years, but he was overtaken before the purpose was accomplished, and his tomb was made in Indiana. The remains were first interred at Florence, Indiana, but were later removed to the family farm lot seven miles above Vevay; and here the wanderer may to this day read the inscription on the tombstone:

Here

Is deposited the remains of John James Dufour,

A native of the Canton of Vaud, Switzerland,

Who departed this life

February 9th, 1827,

Aged 64 years.

Remember man as you pass by

That as you are now so once was I;

But as I am soon you must be;

Prepare for death and follow me.

Dufour must have been possessed of unusual intelligence, forethought and perseverance. He was a pioneer, and he gave his life to prove that the wine grape cannot be grown in eastern North America. Out of the ruin of his hopes there had sprung, even before his death, the branch of promise, but he had not fully perceived its worth. It needed another cast

of mind, one born outside European environments and the traditions of the wine-press, to discern the fact that America was destined to give to the world a new type of grape.

The Branch of Promise

We have seen that both in Kentucky and Indiana one or two varieties of grapes had escaped the sickness, and had given fairly good returns. The varieties which are mentioned as successful are the Burgundy, Madeira and Cape. We have no knowledge of what these Burgundy and Madeira grapes were, but they were probably not of European origin. It is probable that they were offshoots of some native grape which had somewhere been impressed into cultivation. They seem to have attracted little attention, however, and were soon lost, so that their history need not be pursued farther.

But the Cape grape persisted, and eventually became the leading grape at Vevay. Aimé Mererod remembers it, and still wonders what its origin may have been. It has turned out that this grape was the beginning of successful American grape culture, and we must inquire into its history. Dufour obtained the variety from Legaux, at Philadelphia. Legaux "certified having received them from the Cape of Good Hope," as Dufour says, and Dufour and his companions called it the Cape grape. In M'Mahon's account, in 1806, of some of the vines "under trial at the Spring Hill Vineyard," however, there is no variety which answers to this. It is evident that Legaux's company placed little estimation upon this grape; and

when the imported varieties failed, the project was apparently abandoned.

This Cape grape appears to have been really an offshoot of the wild fox-grape, or *Vitis Labrusca*, and it is, therefore, the forerunner of the varieties which we now cultivate everywhere in our vineyards. It was also known as the Schuylkill Muscadel and Clifton's Constantia. These names are kept distinct by Adlum, the earliest writer upon the native grape, who declared that it was the Constantia which was grown by Mr. Legaux, and which was "foisted on the public as the Cape of Good Hope grape." The Constantia came up in William Clifton's garden, in Philadelphia, "by chance, * * * as it never was planted or sown by him, or any of his family." The Muscadel type "was found growing near Schuylkill River, by a Mr. Alexander, the gardener to one of the Mr. Penns, while Governor of Pennsylvania, before the American Revolution." Johnson, in 1806, following the opinions of Legaux, speaks of the Constantia as coming from the Cape of Good Hope, and of the Alexander as a grape "found in many parts of the middle states, and most probably in the northern if not in the southern." Whether the Alexander and Constantia were really identical, as modern writers affirm, will probably never be known; but I strongly suspect that they represent two natural but very similar varieties. The Cape grape is now known in the books under the name of Alexander.*

*It is strange, however, that a specimen in the herbarium of the Phila. Acad. Nat. Sci. labeled "Trasker's or Alexander grape," and said to have been collected by Nuttall, is *Vitis cinerea*; but the labels must have been shifted in the progress of time.

It had been declared in Dufour's time that the Cape grape was really an offshoot of the wild grape of the Atlantic slope, but Dufour was so strongly prejudiced against the native grapes that he would never admit such an origin, although he was ready to admit the good qualities of the variety. "The Cape grape," he says, "has been slandered and cried down to a mere wild grape. It is true, that it is a very coarse grape, unfit for table use, for those who have eaten the best sort in Europe, or who can get a better one. It has a very thick skin and pulp, but the juice is very sweet when perfectly ripe and has the taste of the strawberry, which gives a fine perfume to the wine; such as made the President Jefferson say, that there was no other such tasted wine within his knowledge in the world." This "fine perfume," which in Dufour's judgment disproved any plebeian American origin, is the very "foxiness" which all modern grape-growers associate with the native grapes, and which they are seeking to breed out of them.

But while Dufour was determined to "try to save the character of our Cape grapes from being made merely wild grapes," he was nevertheless convinced that it was "a very precious plant to the United States." Dufour had the privilege of appearing before Mr. Legaux's association in Philadelphia in 1806, and of explaining to the "very numerous" members the partial success of the grape projects in the West, although it was from the Legaux vineyard itself that the westerners had obtained their plants. "I briefly answered," he says, "that all the mystery of our success consisted in nursing only the vines that were

prosperous, no matter how good or how bad their fruit was; for I was fully of the opinion, that no other existing this side of the Atlantic, would ever remunerate for the trouble of attendance; that the Cape grape was the only one reared by the Swiss settlers; that it was a hardy and thrifty plant, giving regular if not large crops of grapes, equal to a majority of the French vineyards; according to Chap-tal's account—making a good wine inferior but to a minority of the European wines, and that it rewarded its cultivator if industrious, as well as any other American produce." It was of this variety that Dufour made what he called his "subsequent and prosperous plantation" on the Ohio, and it is presumably the one with which the religious community of the Harmonists, on the lower Wabash, in Indiana, also made a successful venture in grape-growing.

Having had this successful experience upon the Ohio, Dufour indulges in a retrospect of what might have been the success of the Kentucky vineyard, if his associates had not abandoned the enterprise when he was in Europe: "Now let us see the difference, if we had punctually followed the plan, and began first by the collection of \$8,000, and the purchase of 5 families of negroes, for five thousand dollars, we could then have had from 15 to 20 head, big and small, I could certainly have procured by our joint labor, enough to support us all, after the second year, besides planting as many vines as we have done; and although the first planting had failed, we would surely, in 1809 or 1810, have at least 20 acres of bearing vines of the Cape grapes, which, at the average of 180 gallons per acre, as that is the pro-

duct on the Ohio, would give about 15 gallons per share, besides paying what was coming to me. The wine then fetched \$2 per gallon, and the vineyard would have been yearly increasing. By this time, with only common good luck among the slaves, there would be at least thirty able hands of both sexes, besides a great many youngsters, with whom I could tend 100 acres of vineyards, besides raising enough for the support of all, at 180 gallons per acre, would give 85 gallons per share, worth as many dollars besides my reserve; and the capital stock would be worth about tenfold. Those who doubt the aforesaid calculation, have only to come and see our vineyards and vintage on the Ohio, and calculate for themselves." Dufour writes in the tone of the advocate. He is apologetic for the failures of the experiments and exultant over the success with the Cape grape; but he appears not to have caught the inspiration that this very Cape grape was the beginning and prophecy of a new type of fruit.

Wine was made from the Cape grape, although the variety was not a wine grape; that is, it would not attract attention in the presence of successfully grown European wine grapes. Adlum described it in 1823 as "a deep purple approaching to black; it is recommended by some for the table; it has a pulp in it, is a great bearer, and makes a good Wine." William Bartram, in 1804, in his account of "American Grapes" in the "Medical Repository," speaks of the Alexander type as follows: "Before they are quite ripe, some think they possess a little of the stingy flavour of the fox-grape, but my taste never could discover it. It has been supposed to be

a hybrid between *Vitis sylvestris* (common bunch grape) and *Vitis vinifera*, because it was found on the rocky hills near the Schuylkill, above the upper ferry, in the neighborhood of an old vineyard of European grapes: but I believe it to be an American." The variety was never widely disseminated, and it is unknown to the present generation. It had nearly passed out of cultivation by 1850, and it was probably not planted to any extent for ten years before that time. It was driven out by the Catawba, which was "almost the only variety planted" in the Cincinnati grape region in 1850, according to Robert Buchanan; and from that time until now there has been a competition and succession of varieties,—an indubitable proof of progress or evolution.

It should be said, however, that the Cape grape did not pass from cultivation wholly because of lack of merit for wine, but partly because the wine was too sour unless it was artificially sweetened. In 1845, Nicholas Longworth declared in his pamphlet upon "The Cultivation of the Grape," that "the Cape is generally free from rot, and bears and ripens well, and makes a better wine than Isabella." In speaking of the settlers at Vevay, he continues: "They cultivated the Cape grape only (Schuylkill Muscadel), and erred in the method of manufacture from that grape. They fermented it on the skin, and made from it a hard, rough, red wine, and seldom fit for table use, and only calculated to make a fine wine sangaree. The same grape, gathered before any fermentation has taken place in the fruit, and pressed as soon as gathered, with the addition of from 12 to

16 oz. of New Orleans sugar to the gallon, and after the fermentation is complete, the addition of as much brandy as is added to the Madeira wine, and proper age given it, makes a wine, in color the same as Madeira, and equal to the imported Madeira of the second quality. We are abandoning the cultivation of this grape on the Ohio, for wine. I deem it still worthy of cultivation. We have been led to the abandonment of it, from the opinion of our German vine dressers and German wine drinkers, who are opposed to sugar and brandy in the manufacture of wine."

Before leaving the Cape grape, let us take a survey of the extent of vine-growing in this country at the time that this variety began to be supplanted by the Catawba. The only statistical account of the vineyards of this time is that contained in Rafinesque's curious "American Manual of the Grape Vines and the Art of Making Wine," published in 1830. Rafinesque's writings are not generally held in high esteem, but there is no occasion to discredit his census of American viticultural interests. "A capital mistake," he says, "was the attempt to make Madeira wine in America, instead of American wine." He then proceeds:

"These and other causes have discouraged the attempts of a vine company established on purpose in Pennsylvania. Mr. Legaux, the manager, by his deceptions in grapes, calling them by false names, and his bad management, threw discredit on the attempt. However, by calling our Bland and Alexander grapes *Madeira* and *Cape*, he was instrumental in diffusing them among those who would not have noticed nor bought them if known as native vines.

"Notwithstanding these difficulties, many patriotic individuals have persisted in the endeavor to make the United States a wine country, by establishing nurseries and vineyards. Such were Major Adlum, of Georgetown, and Mr. Dufour, of Vevay, who have also both published works on the cultivation of vines. Mr. Samuel Maurick, of South Carolina (the first exporter of our cotton in 1784), who established a large vineyard at Pendleton. Mr. Thomas Echelberger, of York, Penn., who has been instrumental in establishing 20 vineyards near York.

"In 1825 I collected an account of our principal vineyards and nurseries of vines. They were then only 60 of 1 to 20 acres each, altogether 600 acres. While now, in 1830, they amount to 200 of 3 to 40 acres, or nearly 5,000 acres of vineyards. Thus having increased tenfold within 5 years, at which rate they promise to become a permanent and increasing cultivation.

"Wishing to preserve the names of the public benefactors who had in 1825 established our first vineyards, I herewith insert their names. They are independent of the vineyards of York, Vevay, and Vincennes.

"In New York, George Gibbs, Swift, Prince, Lansing, Loubat, &c.

"In Pennsylvania, Carr, James, Potter, J. Webb, Legaux, Echelberger, E. Bonsall, Stoys, Lemoine, Rapp.

"In Delaware, Broome, J. Gibbs, &c.

"In Maryland, Adlum, W. Bernie, C. Varle, R. Sinclair, W. Miles, &c.

"In Virginia, Lockhart, Zane, R. Weir, Noel, J. Browne, J. Duling, &c.

"In Carolina, Habersham, Noisette, &c.

"In Georgia, Maurick, James Gardiner, S. Grimes, Checteau, M'Call.

"In New Jersey, Cooper, at Camden. Another at Mount Holly.

"In Ohio, Gen. Harrison, Longworth, Dufour, &c.

"In Indiana, Rapp of Harmony, the French of Vincennes.

"In Alabama, Dr. S. Brown, and at Eagleville.

"The average crop of wine with us is 300 gallons per acre. At York, where 2,700 vines are put on one acre, each vine has often produced a quart of wine, and thus 675 gallons per acre, value \$675 in 1823, besides \$200 for 5,000 cuttings. One acre of vineyard did then let for \$200 or 300, thus value of the acre about \$5,000! This was in poor soil unfit for wheat, and for mere Claret.

"Now in 1830, that common French Claret often sells only at 50 cents the gallon, the income must be less. I hope our clarets may, in time, be sold for 25 cents the gallon, and table grapes at one cent the lb., and even then an acre of vineyard will give an income of \$75, and be worth \$1,000 the acre."*

John Adlum and the Catawba

The chief distinction of the Cape grape is the fact that it was the variety which first introduced to public notice a distinctively American type of viticulture. It appears to have had little merit in point of quality, notwithstanding Bartram's encomium of it. It never attained to a wide planting. The first great

*The reader can find an excellent account of American wines, with references to early writers and experimenters, in Putman's Magazine, iv. 504, 611 (1854). An extract from the article is published in Wells' "Year-Book of Agriculture" for 1855-6, p. 307. He may also consult an article on native grapes by D. M. Balch in Proc. Essex. Inst. iv (1864).

American grape was the Catawba, and it is still one of the four leading contemporaneous varieties of the fox-grape type, the others being Concord, Delaware, and Niagara. This superb grape, which leads all successful northern varieties in its wine-making qualities, was brought to the attention of fruit-growers by John Adlum, of the District of Columbia, one of the most ingenuous benefactors of our agriculture. (See frontispiece.)

Adlum merits our attention in three respects,—for his perception of the general fact that American grape-culture must be built upon the improvement of our native species; for his attempt to establish an experiment station; and for the introduction of the Catawba grape. He began his experiments towards the close of last century. He planted a vineyard on Rock Creek, in the District of Columbia, comprising both imported



and native varieties. He finally discarded the foreign kinds. "It is unnecessary," he writes, "to seek for more temperate latitudes for the cultivation of the vine. The way is to drop most kinds of foreign vines at once (except a few for the table), and seek for the best kinds of our largest native Grapes, and if properly managed there can be no doubt but we can make as much Wine, if not more, than any part of the world, on the same space of ground, as far north as the 43d degree, if not further north, and of good quality." In 1823, he published, in Washington, the first indigenous book upon grape culture; and Rafinesque further commemorated him by giving the name *Adlumia* to the beautiful Allegheny Vine, or Smoke Vine, of our northern woods (Fig. 10). A second edition of the book, made exotic by the addition of much pretentious foreign writing, appeared in 1828.

The effort of Adlum to establish "an experimental farm" is one of the earliest attempts of the kind on record in this country, and it should have proper credit, now that the experiment station movement is so thoroughly established. He despaired that, "from the progress of improvement, and the rapid increase of population," the native grapes were rapidly diminishing, so that they seem to be in danger of extinction. "It was to prevent this evil, (as far as I could be instrumental in preventing it,) that I wished to obtain of the President of the United States, a few years ago, a lease of a portion of the public ground in the City for the purpose of forming a Vineyard, and of cultivating an experimental farm. It was my intention, had I been successful, to procure cuttings

of the different species of the native Vine, to be found in the United States, to ascertain their growth, soil and produce, and to exhibit to the Nation, a new source of wealth, which had been too long neglected. My application was, however, rejected, and I have been obliged to prosecute the undertaking myself, without assistance and without patronage, and this I have done to the full extent of my very limited means. A desire to be useful to my countrymen, has animated all my efforts and given a stimulus to all my exertions. * * * As I am advancing in years, and know not when I may be called hence, I am solicitous that the information I have acquired shall not die with me." Poor Adlum! It is a pathetic story of a man struggling on in advance of his time, supported only by the confidence that his labors would some day come to a full fruition. Let us twine a wreath of the fragile Adlunia, and renew his memory when every returning vintage grows purple in the autumn sun!

Adlum's third claim to our remembrance, and the one of particular importance in the present inquiry, is the introduction of the Catawba grape, which marks the second epoch in American grape-growing. It seems that a Mrs. Scholl, who kept a public house at Clarksburg, Montgomery county, Maryland, had a grape vine of much renown which Adlum pruned in February, 1819, "for the sake of the cuttings." "A German Priest, who saw Mrs. Scholl's Vine in full bearing and when ripe, pronounced them the true Tokay, and said he saw the same kind growing in Tokay, in Hungary." From this circumstance, Adlum called the grape the Tokay, and apparently made no

inquiry, at the time, into its origin. The variety must have been somewhat distributed at this time, for Adlum says that it was also grown by J. Johnston, near Frederickton, Maryland. Adlum sent cuttings of this grape to various persons, one of whom, Nicholas Longworth, of Cincinnati, because of this aid, became the third genius of American grape-growing.

In the first edition of his book, Adlum called this grape the Tokay. "Where I got cuttings of this Grape," he writes, "they were of a beautiful lilack colour, and a delicate taste for the table; with me they are much higher coloured than they were at the places I got them from, and have somewhat of a musky taste, tolerable for the table. They are very great bearers, and make an excellent Wine." In the second edition, 1828, he calls it Catawba, and says: "This I look upon as one of the best wine grapes in the United States; and I say the very best. It is a very tolerable table grape. Those that ripen in the sun, are of a deep purple color; where they are partially shaded, they are of a lilac color; and where they ripen wholly in the shade, and are perfectly ripe, they are white, rich, sweet and vinous. When they are colored, they have somewhat of a musky taste, resembling the Frontignac. They are very great and certain bearers—and it will produce a greater variety of good wines than any other known grape—from Tokay and Champaign, down to Sauterne."

The genesis of the Catawba grape has always been a subject of much speculation. The vinous quality of the fruit and the amenability of the foliage to mildew, suggest hybridity with the European vine, although the botanical characters of the variety are

clearly those of the wild fox-grape, *Vitis Labrusca*. The Catawba was found wild in the woods of Buncombe County, in extreme western North Carolina, by one Murray, who emigrated to that country from Pennsylvania about 1801, settling on the Kentucky and Warm Spring trail. The farm and neighborhood was called Murraysville, and it lies ten miles southeast of the present Asheville. The grapes were found upon this farm in 1802, growing wild in great profusion. Another variety was also found, bearing very long, crowded clusters of dark purple grapes, but the fruit was not so good as that of the variety whose history we are tracing. This better variety had open clusters of reddish grapes,—features which the grape-grower will recognize as characteristic of the Catawba. When the forest was removed, the grapes became larger and better. The following year, 1803, there came to Murraysville commissioners to settle the disputed boundaries of North Carolina and Georgia, and these persons tasted of the grapes and pronounced them good. Quakers from Newberry District, South Carolina, passed through the place in 1805 on their way to Ohio, and they took some of these grapes with them, but nothing is known of any offspring of these fruits which may have originated with the emigrants. In 1807, General Davy, United States Senator, a resident of Rocky Mount, on the Catawba River, transplanted some of the vines to his own place; and some time between 1807 and 1816 he took cuttings or vines to Washington and distributed them amongst friends in Maryland as the Catawba Grape. Mrs. Scholl probably obtained her vines of him or of his friends, and from her Adlum secured his cuttings.

As late as 1821, Dr. Solomon Beach, of southern Ohio, found these grapes still growing wild at Murraysville. The country abounded in grapes, but Mrs. Murray pointed out one vine of great excellence, which grew over a small oak tree in sight from the door. This particular vine bore profusely a fruit of "a reddish color, with a purple, dusky appearance; the taste sweet and pleasant, with a peculiar, agreeable flavor." This vine is evidently the one from which the variety was propagated. The region in which this grape was found is on the summit of the Black Ridge, in a thinly timbered region with poor and loose, gravelly soil.

The conditions of the finding of the Catawba seem to leave no doubt, therefore, that the variety is a pure native, uncontaminated by hybridity with European varieties. It is, of course, conceivable that a bird may have dropped a seed which it got in a garden, but the presumption is against it. Dufour was so loth to believe that native grapes could have merit for the cultivator that he was inclined to explain the origin of promising varieties in the wild by supposing that birds had taken the seeds there. "A blackbird or a wood-picker, eating a berry of the Sweetwater, in a garden at New-York, or one of the Cape grapes at Spring-mill, may travel," he writes, "hundreds of miles before he sows the seed of it; and we may naturally foresee, that the number of wild grapes having some similarity to the European sorts, must increase gradually." But all the records agree in saying that there were several or even many sorts of wild grapes growing in the vicinity of Murraysville, and a number of them were of good quality. It

would be violence to suppose that all of them were accidental hybrids with European types which were unknown to the region; and there is no more reason to suppose that the Catawba, alone, was a hybrid than to suppose that all the rest of them had a similar impure origin. Moreover, we know that the wild *Vitis Labrusca* is capable of producing very many curious and wide variations in its fruit. We must conclude, therefore, with the great majority of botanists and intelligent grape-growers, that the Catawba grape is a pure native. A reigning wild form of this fox-grape is shown in Fig. 11.

An anonymous correspondent of the "New England Farmer," in March, 1824,—evidently a member of the House of Representatives—gives the following account of Adlum's vineyard: "A friend and myself, before the meeting of the House this morning, rode to the Vineyard of Mr. Adlum, at Georgetown, three or four miles from this city, for the purpose of obtaining a bundle of slips to be forwarded to the N. York Horticultural Society, and by them disposed of as may be deemed proper. Unfortunately my purpose was defeated to-day by the accidental absence of the proprietor. We however had the pleasure of surveying Mr. Adlum's grounds, and of observing his mode of cultivating the vine. His vineyard is in a sequestered and lonely situation, surrounded by hills and woods, on the banks of Rock Creek, a small branch of the Potomack. It is planted on a steep declivity, looking to the south, and covering several acres. The soil is a light loam, stony and moist, the growth about it being chiefly white oak. At the lower verge, passes a small brook planted with willows, from which a black vine-dresser was very busy in plucking

Fig. 11. Wild fox-grape, *Vitis Labrusca*. Photo. by T. V. Manson.

twigs, to be used in tying up the tendrils, instead of strings, which check the circulation and impede the growth. The vine is planted in rows, ranged one above another along the slope, so as to catch all the moisture that falls, and the better to retain the artificial irrigation. Between the rows, which are at about twice the distance of Indian corn, there is sufficient space for using the plough, to keep the ground light and free from weeds. The soil is also enriched by common barn-yard manure.

"There are several distinct departments in the grounds, set apart for the cultivation of numerous varieties of the vine. Mr. Adlum has in all twenty or thirty different kinds, among which are the following: Hulin's Orwigsburgh grape, Bland's Madeira, Clifton's Constantia, Tokay, Schuylkill Muscadel, Worthington grape, Carolina purple Muscadine, Red juice, large fox grape, Malmsey, purple Frontinac, Royal Muscadine, black Hamburgh, black cluster, Syrian, Clapiers, Miller Bergundy, and white sweet water.

"Mrs. Adlum received us with much politeness, and treated us with a glass of two kinds of Tokay wine of an excellent quality. It is found upon the tables of the Secretaries, and other citizens of Washington, not less on account of its intrinsic excellence, than from a wish to encourage the growth of the vine, and the cause of domestic manufactures."

Major Adlum occupies such a commanding place in our horticultural evolution that the reader will be glad of a sketch of his personal history. Unfortunately, his works have not attracted the attention of biographers and historians; and it is with more than common pleasure that I am able, through the aid of his grand-

daughter, Mrs. J. W. Henry, of Washington, to draw a rapid picture of the man. John Adlum was the son of Joseph and Catherine Adlum, and was born in York, Pennsylvania, April 29, 1759. At the age of 54, he married his cousin, Miss Margaret Adlum, daughter of John Adlum, of Fredericktown, Md. They had two children, Margaret C., afterwards Mrs. Cornelius Barber, of Washington, D. C., and Anna Maria, afterwards Mrs. H. Dent. They lived several years near Havre de Grace, when Mr. Adlum moved to Montgomery county, Md., where he lived for a few years. His last change of residence was to "The Vineyard," two miles from Georgetown, D. C., where he died March 1, 1836. It was at "The Vineyard" that he first began the cultivation of grapes. He was a soldier in the Revolution, a major in the Provisional Army during the administration of the elder Adams, and afterwards a brigadier-general in the militia of Pennsylvania. It is said of him, that, "as a scientific agriculturist, he had few superiors. He devoted almost the whole of his life to the acquisition and diffusion of useful information." "In early life he was a great friend of Dr. Joseph Priestly, of Northumberland, and the knowledge he acquired of chemical science from that learned philosopher he applied with signal success to various agricultural operations." His wife died at the residence of their daughter, Mrs. Barber, July 16, 1852, at the age of 86. Major Adlum was also a surveyor, and in 1789 he was directed by Surveyor General Lukens to survey the reserved tracts of land at Presque Isle (Erie), Le Boeuf, etc. The same year he was appointed by the government, on the recommendation of William Maclay, Benjamin Rush, Professor Nicholson, and Colonel Thomas Hart-

ley, a commissioner for examining the navigation of the Susquehanna River, and subsequently, with Benjamin Rittenhouse, to examine the Schuylkill River. On the 27th of June, 1791, he wrote to Governor Mifflin that he was at New Town with Colonel Timothy Pickering to meet the Oneida and Onondaga Indians. They were on their way to Painted Post, where the meeting was to be held. In August of the same year, he wrote a long letter from Fort Franklin, where he met Cornplanter and other chiefs on public business. He at one time lived at Muncy, and assisted in making an early map of Pennsylvania. On the 14th of April, 1795, he was appointed by Governor Mifflin one of the first associate judges of Lycoming county, and resigned February 16, 1798, on account of contemplated change of residence.

Major Adlum has been described as being a tall, stout, muscular man, and very active in his movements. He had blue eyes, light hair, a florid complexion, and a smooth-shaven face. He was very benevolent, and loved to aid the needy and unfortunate. The frontispiece portrait is reduced from an oil painting by Peel.

The Rise of Commercial Viticulture

Nicholas Longworth, at Cincinnati, received cuttings of the Catawba from Adlum in 1825, and thereupon the second era of viticulture, west of the Alleghenies, began. The first attempt, at Vevay, New Harmony, Vincennes, and other places, was beginning to feel insecure. A better variety than the Cape grape, and a surer one than the European kinds, was wanted. The Catawba seemed to answer the demand. Longworth, who had come from New Jersey, was the disseminator and pro-

motor of the new light. He was a man of strong personality and great enterprise, and he threw himself full length into the new grape-growing. He was farmer and

Fig. 12. Nicholas Longworth at 74 years.

banker, and died possessed of great wealth. His grape-growing and wine-making were eminently successful for many years. In 1850, he wrote that the Catawba "will be worth millions of dollars to the United States, and I doubt not that grapes of equal value are yet to be found.

* * * If the wild hills of California be as rich in

grapes as in gold dust, Jerseyman though I am, I shall be more gratified to receive a grape cutting than the largest lump of gold that region has ever produced." In 1841, he sent a few bottles of wine, made in his own vineyards, to London "for distribution among the English horticulturists." This wine was two years old, and was made of "the pure juice of an American grape." At that time, Mr. Longworth had forty acres in grapes, and he cultivated "American grapes only, with one exception, and that was sent me as a native."

This vine-growing spread until, in 1859, Cist declares that "the number of acres in vineyard culture within twenty miles around Cincinnati, is now estimated at two thousand. An average yield for a series of years, is supposed to be two hundred gallons to the acre, which is about the average for France and Germany." Longworth wrote, in 1849, that "our vineyards may have produced 800, and possibly 1,000 gallons on an acre, but no vineyard has averaged 300 gallons for ten years." The wine was worth, at the press, from one dollar to a dollar and twenty-five cents a gallon, and twenty-five cents a gallon more when secured at the cellars of the vintners. The same authority, Cist, in "Cincinnati in 1859," speaks of the rise of grape-planting in Tennessee, Georgia, Alabama, and the Carolinas, and says that "for the last three or four years past, the sales of grape roots and cuttings in Cincinnati, for the South and Southwest, have averaged about two hundred thousand roots and four hundred thousand cuttings annually, and principally of the Catawba grape."

Longworth is called by E. J. Hooper "the father of American grape culture." Robert Buchanan writes, in 1850, that "to Mr. Longworth, more than to any other

man in the West, we are most indebted for our knowledge in grape culture. Mr. Longworth has, within the last twenty-seven years, with unwearied zeal and a liberal expenditure of money, in numerous experiments with foreign and native grapes, succeeded in enabling himself and others to present to the public a sparkling Catawba, rivaling the best French Champagne, and a dry wine from the same grape, that compares favorably with the celebrated Hock wine of the Rhine."

But Longworth was also an early and ardent advocate of the cultivation of the strawberry, and wrote the first American treatise upon that fruit, before 1850, when Cincinnati, in the language of Robert Buchanan, had become "famous for her fine sugar-cured hams, sparkling Catawba wines, and a cheap and abundant strawberry market." Longworth was "the chief disseminator of that most important fact, the sexual character of the strawberry," as Hooper puts it; by which it is meant that he expounded the fact that the flowers of some varieties of strawberries lack stamens, and that stamen-bearing varieties must be planted with them to insure fertilization. This fact had been observed long before his time. Dufour, for example, had taken note of it. But it remained for Longworth to fully expound it to the horticulturist.

Longworth was born in Newark, New Jersey, in 1783; he died in Cincinnati, where he had lived for about sixty years, in 1863. The Bishop of Cincinnati, J. B. Purcell, wrote in 1841 of Mr. Longworth "from long and intimate acquaintance" as "one of the wealthiest, most intelligent, and enterprising citizens of Cincinnati." The editor of the "Horticulturist," upon the occasion of Mr. Longworth's death in 1863, wrote:

"He did more to encourage grape culture than any other man of his day, and he was the first to make for market a good American wine. His vineyards, including those of his tenants, were of vast extent. When the history of grape culture in the United States shall be written, the labors of Nicholas Longworth will form an important part of it."

Under the stimulus of this rapidly enlarging grape interest, gardening pursuits became prominent about Cincinnati, and there had developed, by 1850, a center of horticultural influence which eclipsed, in the character of its men and the variety of its interests, any similar community which has ever arisen in the West. A notable company of horticultural authors spread this influence far and wide. At the head and front of this company of writers were Longworth and John A. Warder; and they were closely seconded by Robert Buchanan, E. J. Hooper, F. R. Elliott, G. M. Kern, Thomas Affleck, Adolph Strauch, Charles Reemelin, and Edward Sayers, the last having removed from New England after his career as an author was established. With these names should be associated those of many enterprising vineyardists, especially Mottier, S. Mosher, L. Rehfuss, Werk, Bogen, J. A. Corneau, John Williamson, T. H. Yeatman.

Grape-growing was now—before the middle of the century—attracting attention in many parts of the country, and other varieties than the Catawba were concerned in its spread. While Adlum was giving his attention to the Catawba, another grape, supposed to be a native of Dorchester, South Carolina, was gaining favor in the North. This had been taken North probably as early as 1816. It was introduced

into New York by Mrs. Isabella Gibbs, of Brooklyn, from whom it passed to William Robert Prince, and for whom he named it the Isabella. This was the third great American grape in point of historical importance, and it is another offshoot of the southern type of the wild fox-grape, *Vitis Labrusca*. "It is a dark purple fruit, of a large size, oval form, and juicy, and equals some of the secondary European grapes," wrote Prince in 1830; "and for vigour of growth, and an abundant yield, exceeds any other yet cultivated in this country, and requires no protection during the winter season." It was thought to be a hardier grape than the Catawba, and to ripen earlier in the fall, and for these reasons it obtained great favor in the northernmost states, and occasional vines of it may still be seen about old establishments. It should be said, before leaving the Isabella, that fifty years ago its American birth was strongly disputed, and the most direct evidence was adduced to show that it is a Spanish grape. Bernard Laspeyre, a noted grape grower near Wilmington, North Carolina, states that he discovered the grape in the garden of another Frenchman at Charleston, South Carolina, and that this man had himself brought it from Spain. This history is fully set forth in Spooner's "Cultivation of American Grape Vines," in 1846, in the second volume of the "Western Horticultural Review," 1852, and in other early writings. While the records seem to be explicit, the botanical characters of the Isabella are so clearly those of the native fox-grape that all writers now agree that it is American, or at most only a dilute hybrid with the European type. There must have been some error in Laspeyre's history; or it is

possible that his grape was really not the Isabella, but a closely similar variety.

Progressive horticulturists were now fully convinced of the importance of the native grapes. Attempts to grow the European varieties in the open air were still made here and there, but there were no longer any sustained or concerted efforts to introduce them, and everyone began to feel that the hope for American grape-culture lies in the amelioration of the native species. Various persons made definite attempts to secure promising wild forms of grapes. Prince described eighty-one native grapes in his "Treatise on the Vine," in 1830. Even Johnson, in 1806, while recommending chiefly the European grapes, says that "the sorts of vines are too numerous to mention, even if confined to the American alone;" but he evidently had in mind the wild forms rather more than those which had been brought into cultivation. As early as 1820 or 1821, Mr. Herbemont, of South Carolina, had sent out a circular requesting cuttings of native grapes. (See page 78.) Longworth made a similar request in the *Cincinnati Gazette* in 1848 or 1849, and twenty-four varieties were sent him in the spring of 1849. From 1840 on, the annual crops of novel varieties have afforded a continuous fund of inspiration to those with grape-growing proclivities; but by far the greater part of the novelties have fallen by the way, and are now forgotten. No doubt, there have been two thousand or three thousand varieties, more or less, disseminated in the last fifty or sixty years, most of which are offspring of our native species.

About 1830, grapes were planted at Hammondsport, at the southern extremity of Keuka Lake, in

western New York, and this proved to be the beginning of the famous New York vineyard interest, which, as practiced about the central lakes, is to this day the most important Catawba-growing region in the land. About that time, Rev. William Bostwick planted vines of Catawba and Isabella, and he raised excellent grapes. About 1843, William Hastings planted vines of the same varieties in his garden, and was also successful. The first regular vineyard in the region was one of about two acres of Catawbas and Isabellas, planted in the town of Pulteney in 1853. But as early as 1846, grapes were shipped from this Keuka Lake region to New York. A shipment of two hundred to three hundred pounds, according to George C. Snow, shipped on the Erie Canal, broke the New York city market. In 1890, the same region shipped, exclusive of the amount used for wine, about twenty thousand tons of grapes.

Grape-growing began in the lower Hudson River Valley about the same time as about Keuka Lake. One of the earliest vineyards was planted in 1845, of Isabella vines, in Ulster county, by William T. Cornell. Another early planter was William Kniffin, a neighbor of Cornell, the originator of the now famous Kniffin system of training. The evolution of grape training has shown the same transformation as that of the grapes themselves. The early methods were essentially or exactly those used in Europe, but with the gradual aggrandizement of the native species, distinctively native systems of training arose. The interest in grapes was soon widespread, having been disseminated from many early small centers from New England and New York to Missouri and the Southern states.

An important grape center early sprung up in Gasconade county, eastern Missouri, a locality which later became conspicuous because of the labors of George Husmann and Jacob Rommel. The former settled at Hermann, and the latter at Morrison. The first cultivated grape to fruit at Hermann, according to Husmann, was an Isabella, which was planted by Mr. Fugger, and which bore in 1845. The first wine was made in 1846. The Catawba was introduced, and first bore in 1848. This variety awakened great interest, but it soon succumbed to disease, and its place was taken by Norton's Virginia, of which we have yet to speak (page 78). Husmann early gave his attention to writing, and has produced "The Cultivation of the Native Grape, and Manufacture of American Wines" (1866), which, in its modern and enlarged form (1880), is known as "American Grape Growing and Wine Making." He also established and edited the "Grape Culturist" (1869-1871), which was the first American journal to devote itself exclusively to a single type of plant. Since Adlum, no writer of books has so clearly and forcibly emphasized the importance of the native grapes as Husmann. Jacob Rommel gave his attention to the breeding of varieties, using a new stock—the river-bank grape (*Vitis vulpina*, or *V. riparia*)—as the parent of crosses. Some of his results are Elvira, Transparent, Faith, Etta, Montefiore, and the like.

It is not our purpose to follow this history further, except to note the introduction of a few remaining novel types of varieties.

In 1843, a new grape was exhibited before the Massachusetts Horticultural Society, in Boston, by Mrs.

Diana Crehore, of Milton, Massachusetts. It was a seedling of the Catawba, with round pale red or amber berries. It was named the Diana, in honor of the originator. This grape soon attracted wide attention, and it was the precursor of a constantly widening stream of ameliorated seedlings of known parentage. The novitiate stage of our grape culture,—the introduction of grapes from the wild,—now came rapidly to a close, and the epoch of definite attempt at the breeding of varieties came on. Some of our native fruits, notably the cranberry and dewberry, are yet in this initiate stage, in which the new varieties are still such as are picked up in wild areas rather than in gardens.

The next great event in the evolution of American grapes was the making of hybrids with the European vine. The first authentic hybrid vine was exhibited before the Massachusetts Horticultural Society in 1854, by John Fisk Allen, author of "A Practical Treatise on the Culture and Treatment of the Grape Vine." It was a hybrid between the Golden Chasselas and Isabella. About this time E. S. Rogers, of Roxbury, Massachusetts, began those remarkable experiments in hybridization which have given us so many excellent varieties. Rogers obtained his first fruits in 1856. J. H. Ricketts, a bookbinder of Newburgh, New York, George Haskell, lawyer, of Ipswich, Massachusetts, Jacob Rommel and Hermann Jaeger, of Missouri, Jacob Moore, of New York, and T. V. Munson, of Texas, have greatly extended our knowledge of the possibilities of crossing amongst the grapes. But the primary hybrids of the American and European species have never made a great impression upon commercial grape-culture, although many of them are much prized for their high quality in the home

garden. What they gain in quality they are apt to lose in amenability to mildew and phylloxera, in lack of robustness, or in infertility of the bloom. The secondary or attenuated hybrids, however,—those born of hybrids, or of a hybrid with some other variety,—give more promise; and of these there are striking examples in Jacob Moore's Brighton and Diamond, and in some of Munson's recent productions. There is promise of much advantage to be gained by the gradual admixture of dilute blood of foreign grapes into our own improved types, but the results are quite as likely to come from accidental admixtures as from intending ones, for most plant-breeders are looking for bold and emphatic results.

All this is well illustrated in the Delaware, which enjoys the distinction of being the only one of the four great American grapes which gives any very strong evidence of foreign blood. This has an obscure history, and the parents, whatever they may be, are so nicely blended in it that they cannot be positively distinguished. It was found in a New Jersey garden about 1850. The owner of the garden, Paul H. Provost, had come from Switzerland, and had brought grape-vines with him. This nondescript vine was at first thought to be an Italian grape, then it was thought to be the Red Traminer of the Old World. Some thought it a seedling from one of the European varieties. But at the present time, most authorities consider it to be a hybrid, perhaps the greater number of them thinking it a cross between some fox-grape and the European vine, and others, like Munson, regarding it as a combination of the fox-grape and the southern wine-grape. It is one of those fortuitous riddles which nature now and then produces, the genesis

of which, if known and well considered, might afford new light to the intending breeder of plants.

The next great event in the evolution of the American grape,—and in respect to its commercial importance, the greatest event of all,—was the introduction of a meritorious variety of the northern fox-grape type. This variety is the Concord. It was introduced early in the fifties. The earliest record of it in the Massachusetts Horticultural Society is in 1853: "E. W. Bull exhibited his new seedling grape, which, under the name of Concord, is now so generally cultivated throughout the country." A year later, "the Concord was shown in great perfection" before the same society. The first fruit of this grape was obtained in 1849. The exact origin of it is obscure. Mr. Bull bought the house at Concord, in which he lived until his death, in 1840. That year, he relates, boys brought up from the river some wild grapes, and scattered them about the place. A seedling appeared, evidently the offspring of these truant grapes. Mr. Bull tended it, and in 1843 he obtained a bunch of grapes from it. He planted seeds of this bunch, and a resulting plant fruited in 1849. The fruit had such merit that all other seedlings were destroyed. The new variety was named the Concord, and although its quality is not the highest, and it was at first disparaged on this account, it is now the dominant grape in all eastern America, and it was the first variety of sufficient hardiness, productiveness and immunity from diseases to carry the culture of the vine into every garden in the land. As an illustration of the extent to which a particular variety or a custom may dominate the industry of a region, we may cite the influence of the Concord upon the people of Chautauqua county, New

York. The variety was introduced there about 1856, by Lincoln Fay, and that region is to this day, with its 26,000 acres of grapes, controlled by the Concord. In

Fig. 13. Ephriam W. Bull, at 83 years. Originator of the Concord grape.

the central lake region of New York, however, where the grape interest began earlier and before the days of the Concord, the Catawba is still the controlling variety, and the wine interest is great.

Ephriam W. Bull, the originator of the Concord, died September 27, 1895, in his ninetieth year, loved

Fig. 14.

Schuyler Worden

at 84 years.

of his neighbors and honored by every countryman who grows or eats a grape. It is a pregnant type, and has given rise to no less than fifty honorable seedlings, which range in color from greenish white to purple-black. It is the one most important type of American grapes, and the really successful commercial viticulture of the country dates from its dissemination; and yet this grape is a pure native fox-grape, and evidently only twice removed from the wild vine. If such humble parentage is capable of developing such an enormous industry, what may we not expect for the future!

The Concord, as we have said, has given us a most extensive and interesting progeny. Some of its offspring are Worden, Moore Early, Pocklington, Eaton and Rockland. Of all the Concord seedlings, the most famous is the Worden, which originated at Minetto, Oswego county, New York, on the grounds of Schuyler Worden, who, although over ninety years of age, still takes the liveliest interest in the variety. The old vine, about thirty-five years old at this writing (1898), is still healthy and productive. The seed from which it came was taken from an isolated Concord vine, and the plant bore at four years from the seed. The variety was named by J. A. Place, a prominent citizen of Oswego and an acquaintance of Worden.

While all these types were developing from the fox-grape, *Vitis Labrusca* (Fig. 11), another native grape of the North had given valuable offspring. This is the river-bank grape, *Vitis vulpina* (*Vitis riparia* of the botanists) (Fig. 15). "In the year 1821," writes W. C. Strong, in his "Culture of the Grape," "Hon. Hugh White, then in the junior class in Hamilton College, New York, planted a seedling vine in the

Fig. 15. The river-bank grape. *Vitis vulpina* (*V. riparia*).

grounds of Professor Noyes, on College Hill, which still remains, and is the original Clinton,—a very hardy, healthy, and productive grape, of the first class. Bunches and berries small, black, with blue bloom; brisk, juicy, quite acid, but improves by keeping until February.” The original Clinton vine is still standing, at Clinton, where it climbs over a great elm tree. Rev. E. P. Powell, of Clinton, writes me that he has known the vine for forty years, and that there can be no mistake about the identity of it. He says: “It is a seedling out of a handful sowed by advice of Professor Noyes,—the greatest genius Hamilton College ever had,—and he selected the best; and this was the Clinton. Where the seed came from, I do not know.” At one time, this Clinton grape was widely disseminated for general vineyard culture, but it could not contend with Concord, Diana, and hosts of other rapidly appearing fox-grapes, and its use is now almost wholly restricted to wine-making; but it introduced a new type of grape—although some authorities suppose it to be a hybrid between the river-bank and fox-grapes—and one which was destined to play a most important part, in a new role, in the years to come (see page 92).

We have already seen (page 13) that the French colonists of the southeastern Atlantic states early made attempts to grow the European vine. These, like all similar attempts in eastern America, had failed. But out of the ruins there had come, early in the century, several types of grapes of much value, all of them possessing great merit for wine. Chief of these are Le Noir and Herbemont. The latter is now widely grown in the South, and it receives its name from

Nicholas Herbemont, who was a public spirited grape-grower of South Carolina in the early part of the century (page 67). This grape had begun to attract attention about Cincinnati as early as 1850, and in 1853 Nicholas Longworth strongly recommended it to the members of the Cincinnati Horticultural Society. Wine making was still the leading motive in Longworth's time, and he was attracted by the Herbemont largely because of its merits for wine. "The singularity of the wine is," he says, "that it has the aroma and flavor of the Spanish Manzanilla, but superior."

While the Herbemont was the leading grape in the South, and was becoming established as far north as the Ohio Valley, another epoch-making grape was coming into notice in the middle South. This was the Norton's Virginia. It was a wild grape, found by Dr. F. A. Lemosq on Cedar Island, in James River, near Richmond, Virginia, in 1835. It was recommended to public favor as a wine grape by Dr. D. N. Norton, an enterprising horticulturist living near Richmond, and the variety now bears his name. The grape early reached the Cincinnati grape settlement, but it was first brought distinctly to the fore in the pioneer West (page 69). Husmann, writing in 1865, details its introduction into Missouri: "It was about this time [1850] that the attention of some of our grape-growers was drawn towards a small, insignificant looking grape, which had been obtained by a Mr. Wiedersprecker from Mr. Heinrichs, who had brought it from Cincinnati, and, almost at the same time, by Dr. Kehr, who had brought it with him from Virginia. The vine seemed a rough customer, and its fruit very insignificant when compared with the

large bunch and berry of the Catawba, but we soon observed that it kept its foliage bright and green when that of the Catawba became sickly and dropped; and also, that no rot or mildew damaged the fruit, when that of the Catawba was nearly destroyed by it. A few tried to propagate it by cuttings, but generally failed to make it grow. They then resorted to grafting and layering, with much better success. After a few years a few bottles of wine were made from it, and found to be very good. But at this time it almost received its death-blow, by a very unfavorable letter from Mr. Longworth, who had been asked his opinion of it, and pronounced it worthless. Of course, with the majority, the fiat of Mr. Longworth, the father of American grape-culture, was conclusive evidence, and they abandoned it. Not all, however; a few persevered, among them Messrs. Jacob Rommel, Poeschel, Langendoerfer, Grein and myself. We thought Mr. Longworth was human and might be mistaken, and trusted as much to the evidence of our senses as to his verdict, therefore increased it as fast as we could, and the sequel proved that we were right. After a few years more, wine was made from it in larger quantities, found to be much better than the first imperfect samples; and now that despised and condemned grape is *the* great variety for red wine, equal, if not superior to the best Burgundy and Port; a wine of which good judges, heavy importers of the best European wines too, will tell you that it has not its equal among all the foreign red wines, which has already saved the lives of thousands of suffering children, men, and women, and, therefore, one of the greatest blessings an all-merciful God has ever bestowed upon suffering humanity. This despised grape is now the rage, and

500,000 of the plants could have been obtained. Need I name it? It is the Norton's Virginia. Truly, 'great oaks from little acorns grow!' and I boldly prophecy to-day that the time is not far distant when thousands upon thousands of our hillsides will be covered with its luxuriant foliage, and its purple juice become one of the exports to Europe, provided, always, that we do not grow so fond of it as to drink it all. I think that this is preëminently a Missouri grape. Here it seems to have found the soil in which it flourishes best. I have seen it in Ohio, but it does not look there as if it was the same grape. And why should it? They drove it from them and discarded it in its youth; we fostered it, and do you not think, dear reader, there sometimes is gratitude in plants as well as men? Other states may plant it and succeed with it, too, to a certain extent, but it will cling with the truest devotion to those localities where it was cared for in its youth."

In 1858, Husmann received from William Robert Prince, the nurseryman of Flushing, Long Island, another grape, the Cynthiana, which is so like the Norton's Virginia as to be almost indistinguishable from it. "This grape promises fair to become a dangerous rival to Norton's Virginia," writes Husmann in 1865. But the Norton was too firmly established to be supplanted by the newcomer, although the two varieties are usually mentioned together when one speaks of wine-making in the middle South. This Cynthiana is understood to have been picked up in the wild in Arkansas.

Now, what are these southern wine-grapes,—Herbement, Le Noir, Norton's Virginia, Cynthiana, and all their kin? To what species do they belong? As

usual, opinions are divided. Practically all authors are agreed that the Norton's Virginia and Cynthiana tribe is a direct offshoot of the wild summer-grape (*Vitis æstivalis*, Fig. 16) of the Middle states and the South. The Herbemont and Le Noir have been held by most writers to have been descended from the same wild species, but our contemporaneous student of the genus, T. V. Munson, derives them from an unrecognized and undescribed European species. "The Herbemont as 'Brown French,' and Le Noir or Jacques as 'Blue French,' he has traced," writes Munson of his own studies, "back through the Bourquin family of Savannah, Georgia, to their bringing to Georgia, in its early settlement over 150 years ago from South France. * * * * * In honor of Gugie Bourquin, who so well assisted me to trace out the origin, in this country, of Herbemont and Le Noir, I named the group as a new species, *Vitis Bourquiniana*." With all the uncertainties and gaps in the records and traditions of events pertaining to the cultivation of plants, and with the constant intervention of seedlings and new varieties, great dependence cannot be placed upon the historical genealogy of the grape. The difficulty is all the greater because the species of grapes are themselves so variable and so like one another, that errors can occur in the records almost before one's eyes. The student must rely more upon the botanical features of the plants than upon the histories of them. For myself, while admitting that my facilities for the study of the question have been less than those of Munson, I am convinced that this Herbemont tribe is an ameliorated form of the native summer-grape, *Vitis æstivalis*. Some of the varieties may be hybrids of

Fig. 16. Summer grape. *Vitis aestivalis*. (From Munson.)

Vitis æstivalis and the European wine-grape. It is very likely that some of these varieties, perhaps even the Herbemont itself, may have been brought from Europe; but if full records had been made of the early introductions of American plants into southern Europe by the returning of the emigrant ships and by other vessels, it is equally likely that we should find that our native summer-grape had been sent to the Old World. At all events, it is unassumable that a native grape, distributed through the Mediterranean region, could have escaped for centuries the critical search of European botanists and the knowledge of hundreds of generations of vignerons, to be discovered at last transplanted in the New World. This southern family of wine-grapes is not further removed from *Vitis æstivalis* than the Concord and some other common fox-grapes are removed from *Vitis Labrusca*; and the botanical features of the family seem to me to be distinctly those of *Vitis æstivalis*. Mr. Munson has raised plants which he considers to belong to his *Vitis Bourquiniana* from seeds which he obtained from Spain; but the specimens which I have seen of these plants seem to me to be only forms of the European wine-grape, *Vitis vinifera*.*

Still another native grape must have a conspicuous place in this history. It is the Scuppernong, a direct offspring of the curious Muscadine grape (*Vitis rotundifolia*, Fig. 17), of the South. It is said that the Scuppernong was discovered on Roanoke Island, North Carolina, by Sir Walter Raleigh's colony, and that the

*The student of this southern type of grapes should consult the writings of Engelmann and Munson. The best and most recent presentation of the characteristics of the group by Munson is to be found in the "Texas Farm and Ranch" for February 8, 1896.

original vine is still in existence. The Muscadine type of grape differs from other species in having a tight, non-shredding bark, unforked tendrils, a very long growth of vine, very late bloom, and few-fruited clusters of globular, thick-skinned, musky-tasted fruits.

Fig. 17. The native Muscadine grape. *Vitis rotundifolia*.

It grows wild from Maryland southwards, but it reaches its greatest perfection south of Virginia. The fruits are purple-black, except in the Scuppernong, which is yellowish. This variety bears four to six large grapes in a cluster, which fall to the ground as they ripen. The Scuppernong has long been highly esteemed in the South, for although the quality is far inferior to that of the Catawba in the opinion of most persons, it makes excellent wine, and it is a regular and abundant bearer;

and those who become accustomed to it are fond of its sweet and perfumed berries. Sidney Weller, of Brinkleyville, North Carolina, extolled the Scuppernong to the Commissioner of Patents in 1853, as the "grape of grapes" for the South. At the State Fair, at Raleigh, he had "exhibited Scuppernong grapes four inches in circumference, unparalleled in size; and no mean judges of wine, from different parts of the country, pronounced my 'Scuppernong hock' the best of wine." Mr. Weller's plantation, which appears to have been composed of Scuppernongs, is described as follows: "The result of my vineyard enterprise and industry therein, is about a dozen acres of flourishing vines, mostly on scaffolding, or as canopies, covering continuously with branches (and when in bearing, with leaves and fruit) overhead, from 8 to 10 feet high, and nothing is seen between these canopies and the ground but main stems of the vines, and the posts or rock pillars to support the frame-work above. My annual yield of wine has been as high as 60 barrels; besides entertaining hundreds of visitors at 25 cents each entrance, and 50 cents per gallon for select grapes gathered to carry away. My vineyard is the largest, I learn, in the South, and I am encouraged to enlarge it every year."

Dr. Peter Wylie, of North Carolina, is said to have succeeded in securing hybrids of the Scuppernong with other species, but they were lost. Of late years, T. V. Munson has taken up the problem, and has several hybrids between this species and the Herbemont type. In 1868, J. Van Buren printed a small book upon "The Scuppernong Grape," at Memphis.

In all this various history, we have seen that four species of grapes have been chiefly concerned in the

evolution of the immense commercial viticulture of Eastern America, and all these species are native to the country. They are the fox-grape (*Vitis Labrusca*), the summer-grape (*Vitis æstivalis*), the Muscadine (*Vitis rotundifolia*), and the river-bank grape (*Vitis vulpina*). Other native species have been concerned in the creation of our viticulture, and still others promise much to the future experimenter; but enough has now been said to acquaint my reader with some of the salient features of the rise of our common varieties of grapes. I shall add to the chapter a list of our native species of grapes, with some remarks respecting their economic importance, and to that list and the catalogue of books, the student who desires to explore the subject is referred.

The grape-growing of eastern America has increased enormously in recent years, largely under the stimulus of the Concord. We have already had Rafinesque's record of the vineyards of 1830 (page 49), and we have had statistics of the acreage about Cincinnati (page 63). In closing this part of our subject, we will find it of interest to take a rapid sweep of the growth of the industry. In 1852, Robert Buchanan made the following survey of the vineyards "in the United States" which were planted for wine-making purposes: "The Ohio River is already called the 'Rhine of America,' and Cincinnati the center of the grape region in this valley. Within twenty miles around the city, more than 1,200 acres are planted in vineyards—at Ripley and Maysville above, about 100 acres—at Vevay, Charleston, and Louisville below, over 250 acres are in vine culture;—making 1,550 acres for the Ohio Valley alone, which is a low estimate.

"At Hermann, Mo., about forty or fifty acres are in vineyards; and in the vicinity of St. Louis, and some other parts of the state, probably twenty or thirty acres more; a few at Belleville, Ill., and elsewhere in that state. Near Reading, Pa., several vineyards are planted and some excellent wines made. In North and South Carolina, the Scuppernong wines have been made for many years, but the number of acres in grape culture is to the writer unknown. A few vineyards are in cultivation in the vicinity of New York and Philadelphia—and Burlington, New Jersey; but more with a view to supply the market with grapes than to make wine. Efforts have been made in the interior of Kentucky, in Tennessee, in western New York, and on the southern shore and islands of Lake Erie, to cultivate the vine for making wine, but sufficient time has not yet elapsed for a fair trial." The United States census returns for 1840 gave the wine crop as 124,734 gallons. In 1850 it was 221,249 gallons. The census of 1890 returns a total grape acreage in the United States of 401,261 acres. Of this area, 213,230 acres were in California, and are, therefore, outside our present discussion, for the Pacific slope grows the Old World wine grapes, not the ameliorated natives. Nearly 200,000 acres, then, were devoted to native-grape culture and these yielded 9,655,905 gallons of wine and 225,636 tons of table grapes. Western New York,—comprising the central lakes, or Catawba districts, and the Chautauqua county or Concord district—is the heaviest producer of any like area. In 1890, New York state produced 2,528,250 gallons of wine and 60,687 tons of table grapes; and these figures are closely seconded by Ohio and Missouri. In 1894, the grape acreage of western New York was

estimated at 58,000 acres. These are astounding figures, when one considers that a century ago profitable grape-culture was impossible in the country, and that many men now living have seen the introduction of most of the varieties of grapes which are successfully grown; and all the varieties have been bred directly or indirectly from the unpromising vines which grow wild in our own fields and woods.

Why Did the Early Vine Experiments Fail?

The reader has no doubt been curious to know, from the outset, why the early attempts to grow the European grape had resulted in such disastrous failure; and now that we are approaching the end of our narrative, I shall proceed at once to gratify his curiosity. The failure was the result of an obscure sickness which caused the leaves to die and drop, and the grapes to rot. There was just enough indefiniteness and speculation about these diseases to make the early grape literature attractive, but in these impertinent days, when we have dragged the whole panorama of nature across the slide of a microscope, we have done away with the mystery, and speak of these diseases familiarly as the downy mildew and black-rot,—or, to be exact, as *Peronospora viticola* and *Læstadia Bidwellii*. If these Latin epithets had been invented in the days of Dufour and his contemporaries, imagination would have been squelched, and all the naive and delightful writing about the behavior of the electric fluid, the strange influences of the different soils, the vagaries of the seasons, the curious effects of

modes of propagation, and the like, would have been lost to future generations!

Some of the failure was also due to the root-louse or phylloxera, but it was probably chiefly the result of the incursions of the fungous disorders mentioned in the last paragraph. The singular thing about all these troubles is that they are native Americans. From time unknown, they have preyed upon the native grapes; but they were not serious upon these natives, because all the most amenable types of grapes had long since perished in the struggle for existence, and the types which now persist are necessarily those which are, in their very make-up or constitution, almost immune from injury, or are least liable to attack. The mildew, for example, finds little to encourage it in the tough and woolly leaf of the fox-grape, and the phylloxera finds tough rations on the hard, cord-like roots of any of our eastern species of grapes. But an unnaturalized and unsophisticated foreigner, being unused to the enemy and undefended, falls a ready victim; or if the enemy is transported to a foreign country, the same thing occurs. These diseases are evidently not native to our Pacific coast region, and the European wine-grape was early introduced there about the missions of the Franciscans, and it has thrived until the present day. In fact, the grape industry of California is like to that of Europe,—chiefly wine and raisins,—and is built upon the Old World wine-grape (*Vitis vinifera*); and for this reason I have omitted, in the previous account, all reference to our Pacific grape-culture. But the phylloxera is now introduced upon the Pacific coast, and is doing much mischief.

The mildew and black-rot and phylloxera have all

been introduced into Europe, where they have wrought widespread havoc. I quote Lodeman's account of the introduction of these fungi, in his "Spraying of Plants:"

"The mildew was first discovered in France in 1878. Millardet saw it in September of that year upon some American grape seedlings growing in the nursery of the Société d'Agriculture de la Gironde, and Plachon at the same time recognized it on the leaves of Jacquez grapes at Coutras, and also received it from various departments of Lot-et-Garonne, and of Rhône. The disease spread rapidly, and was so destructive that in 1882 the fruit in many vineyards was almost entirely destroyed. The climate of France appears to be peculiarly adapted to the growth of this mildew, which flourishes as well upon the varieties of *Vitis vinifera* as upon our American species. In moist seasons it is fully as energetic as in America, or even more so. The leaves fall from the vines, and the grapes are thus prevented from ripening properly. Even in cases in which the vines do not lose all their foliage, a partial reduction is sufficient to decrease the amount of sugar in the grapes to such an extent that their value for wine is very greatly lessened. Many growers did not at first realize the seriousness of this disease. In some vineyards it even obtained a firm foothold without being noticed, for the portions of the fungus which are on the exterior of the leaves are borne on the under side. When, however, it became established in a certain district, all doubts regarding its seriousness vanished, and the vineyardists found themselves confronted by a disease which not only threatened to destroy their vines, but which gave unmistakable proof of its power to do so. The American disease of grapes commonly known as black-rot was first discovered in the vineyards of France in August, 1885. Mr. Ricard, the steward of an estate situated at the gates of the small town of Ganges, at the borders of l'Hérault, was the first to call attention to the presence of this fungus. He saw that his grapes turned brown, then black, while still remaining upon the vine. He sent some of these diseased grapes to the viticultural laboratory of l'École de Montpellier, where Messrs. Viala and Ravaz recognized the parasite. They went to the affected vineyard, and saw that only about thirty

hectares in the plain of Ganges showed diseased grapes. In these vineyards the harvest was reduced about one-half. Immediate and energetic steps were taken to exterminate the fungus, but in 1886 it again appeared. The season proved to be dry, however, and very little damage was done. The area of distribution was, nevertheless, considerably extended. On July 25, 1887, Prillieux received diseased grapes from Azen, in Lot-et-Garonne, and was directed by the minister of agriculture to proceed to the infected district. He found that black-rot existed throughout the entire valley of the Garonne as far as Aiguillon. In some vineyards it was so well established that there appeared to be no doubt that the disease had been present at least a year before its discovery in l'Hérault; it was consequently impossible to determine the first place of infection in France. The disease was new, and at the first not very serious, so that its presence had been overlooked perhaps for more than one year."

But the greatest consternation has been caused, in European countries, by the furious spread of the phylloxera. This insect was introduced into France in 1863 on vines from the United States, but it was not discovered until some years later. About 1865, the root disease which it produces began to attract attention, and so violent was its spread that the French government expended large sums to stamp it out, and, finally, in 1874, a reward of 300,000 francs was offered for a satisfactory remedy. About 1870, the cause of the disease was determined; and then it was found that the root-louse is the normal form of an insect which also produces galls upon the leaves. This leaf-gall form of the insect was described in New York by Dr. Asa Fitch in 1854. It is not our purpose to follow the fortunes of the phylloxera in its triumphant march over Europe. It is enough to say that there are no remedies which can be universally applied. In this dilemma, the French turned to America to dis-

cover why the phylloxera is not a scourge in the land of its birth. The cause was found in the practical immunity of the native vines. At once, there was a demand for cuttings of our wild phylloxera-resistant grapes. But some of the cuttings would not grow, whereas others grew without difficulty. Upon investigation, it was found that cuttings of two species had been sent as one species, and the result of the inquiry has been to clearly distinguish two native grapes which theretofore had been much confounded. These are the frost-grape (*Vitis cordifolia*) and the river-bank grape (*Vitis vulpina*, or *V. riparia*). The latter is now widely used in Europe as stocks upon which to graft the wine-grape; and so it has come that the species which has produced nothing better in the way of fruit than the Clinton (page 75) is now a corner-stone of the viticulture of the Old World. Other native species have contributed to the phylloxera-resistant stocks of Europe, but this species is chief. The fourth edition of the Descriptive Catalogue of Bush & Son & Meissner has the following remarks of this use of American vine-stocks: "Already millions of American grapevines are growing in France, hundreds of thousands in Spain, Italy, Hungary, etc. California also imported many cuttings of riparia [river-bank grape] vines to graft thereon their European (or vinifera) sorts, which succeed there on our phylloxera-resisting stocks. In February, 1894, Senator Fair purchased from us half a million of such cuttings for his new 1,000-acre vineyards near Lakeville, California."

All the old accounts, however, seem to show that the chief cause of the failure of the European vines in America was fungous disease. One of the very

earliest accounts of this mischievous disorder is Johnson's, in 1806, although his entire discussion of it is as follows: "The Mildew sometimes attacks the grapes and fruit, when the vine has been planted in too wet a situation, or when the weeds are suffered to prevail, but never when the vineyard has a gentle declivity." The first explicit account of the vine diseases which I know was made twenty years later. "The different diseases that I have seen afflicting vines are not numerous," writes John James Dufour, in 1826. "They may be denominated, 1st. the Mildew, called *Charbon* or *Tache*, by the French, whose meaning is, by *Charbon*, burnt to a coal, or like a coal; and by *Tache*, a black speck: 2d. Unripeness of the young wood, which causes it to be frostbitten: 3rd. Short jointed, called *Sorbatzi*, by the Swizzers: 4th. Exhaustion, by overbearing." Only one of these classes, the mildew, need attract our attention at this time. Dufour describes it as follows: "The Mildew, or *Charbon*, is the most severe disease that sickeneth grapevines. One of the first symptoms is a mouldy and black dust that appears some time on the under surface of the leaves in the months of July and August, and grows gradually more intense. Black specks then appear on the young parts of the shoots, and on the fruit, as if made with a hot bit of iron: the leaves then crisp and fall, the fruit becomes black, and dries, and what fruit seems to escape the sickness, will not ripen well, and remain uncommonly sour; the young shoots will be extremely brittle, and the pith black." It is very likely that two diseases are confounded in this description. The account of the leaves suggests the downy mildew; but the description of the affected shoots and

fruit is more likely that of the black-rot. B. T. Galloway, Chief of the Division of Vegetable Pathology in the United States Department of Agriculture, tells me that specimens of grapes affected with "charbon," collected by an early botanical traveler in the Ohio Valley, have the black-rot.

Alphonse Loubat, who wrote the third American grape book ("The American Vine Dresser's Guide," New York, 1827, alternate pages English and French), and who made an experiment at grape culture on Long Island, was also overtaken by the vine diseases. "Here he strove," writes Andrew S. Fuller, in the "Record of Horticulture" for 1866, "against mildew and sun-scald for several years, but had to yield at last, as the elements were too much for human exertions to overcome. An old resident of Brooklyn related to the writer, a few years since, many incidents connected with Loubat's experiments; one of which was, that to prevent mildew on the fruit, each bunch was enveloped in paper; consequently they had to be uncovered when exhibited to visitors. This, when the grapes were ripening, consumed most of Loubat's time." Spooner says that Loubat "planted a vineyard of forty acres at New Utrecht, Long Island, which had 150,000 vines of various sizes, and for some years flattered himself with hopes, which resulted in disappointment." Spooner's account of his own experiments illustrates the common experience with the foreign grape, and also affords further evidence that fungous disease was the chief cause of the disasters: "In the year 1827 I planted fifty foreign vines, some of which were from France, and obtained from Mr. Parmentier and Mr. Loubat—others were from Germany, and obtained from Mr.

Knudsen. In four years I was able to exhibit five kinds of fine grapes at the horticultural exhibition of New York at Niblo's Garden; but the vines produced few good bunches, and very soon none at all. The vines and shoots continued to grow for several years, but the fruit was mouldy and black before the period of ripening, and thus were worthless."

With the extension of the grape-planted acres, the diseases attacked the varieties of native origin, like the Catawba and Isabella, and they finally ruined the grape industry of the Cincinnati region. The rot of grapes had begun to attract much attention about Cincinnati previous to 1850. In 1859, Cist made the following record of it: "In the Ohio Valley, for the last three or four years, the grape crop has been much injured by mildew and rot, diseases incident to bad seasons, or sudden atmospheric changes. Many remedies have been tried, but none has yet been found effectual in these cases. It is difficult, by any mode of vineyard cultivation, pruning or training, to conquer disease arising from atmospheric causes." Probably the first published specific for this rot was the following, which was sent to the Commissioner of Patents in 1853, by Anthony Miller, of Portland, Calloway county, Missouri: "My observations have led me to the belief that the 'rot' in the grape depends on a weakness in the vine, even when the ground is rich and well manured. This disease, consisting only in weakness, befalls the vines soon after they bloom. Following this notion, I thought of a remedy, which consists of the following: I take fresh cow manure (without straw, leaves, etc., being mixed with it), which I mix in a ditch, or in a large hogshead, with slops, wash-

water, etc. I stir it once a day until it begins to ferment, and leave it standing several days, and then it is ready for use. When I have no cow manure, any other animal manure, mixed with the offals of tobacco, ashes, lime, and rain-water, will answer the same purpose. Of this fluid I pour about a gallon around the roots of every grape-vine, making a small ditch, five or six inches deep, around the vine, to keep the fluid from running off. When it has soaked into the ground, I cover up the ditch with earth. A month after the blooming of the vine, I repeat this again. In this manner I have kept my grapes sound."

It was thirty years after this mephitic compound was recommended to the public, that the first and great specific for the mildew and black-rot—the Bordeaux mixture—was perfected by the illustrious Millardet and his compeers, in France. It has required the travail of two centuries to give us this simple mixture of blue-stone and lime; but now the most careless urchin may have the knowledge which Dufour, Adlum, Loubat, Buchanan, Longworth, and all the rest, would have given all their worldly goods to possess!

To us, the black-rot and the mildew have come to be subjects of secondary importance. We hold the secret and we can apply the remedy. But they were serious matters in the old days. The following narrative, written by Longworth in 1849, is proof of this, and it also admirably illustrates the common adage that "misfortunes never come singly:"

"My oldest vine-dresser, Father Ammen, has gone the way of all flesh, and I regret his end. He was a worthy old man. Some twelve years since, he lost his wife, and deeply regretted her loss. He assured me,

with tears in his eyes, 'she was just so good in the vineyard as one man, and he might just so well have lost his horse.' He got a second wife, but she was of hasty temper, and gave the old man as good as he sent. Finally, she told him if he would give her five dollars, she would leave him, and never see him more. 'Give you five dollars!' said the old man: 'I will do no such thing; but if you go and never come back, I will give you ten dollars.' The money was paid, and the old man was relieved of that trouble; but one that he deemed greater came. I have heretofore said, that after being my tenant ten years, he was ruined by selling his share of the crop for eight hundred dollars. He cleared out; went to the north part of the state; bought land, and planted a vineyard. The location was too far north. His vines were killed, and he came back a poor man, and began a new vineyard on a farm of mine, adjoining his old one, on which his son-in-law has resided since he left it. This year his vineyard came into bearing, and the old man's heart rejoiced to think that he should again be able to sit under the shade of his favorite tree, and enliven his heart with wine of his own making. But, alas! the rot came, and blasted his prospects. He became dispirited; which, the cholera discovering, a few days since, seized his victim. He was taken to the house of his son-in-law (for he lived alone, and I could not prevail on him to take a *Frau* for the third time), when they urged him to take medicine, but he refused. He was told if he did not, in a few hours he must die. 'What I care?' said the old man, 'I take none. What I want to live for? My grapes all rotten!' A few hours, and he was no more. Peace to his ashes."

Synopsis of the American Species of Grapes

If America is a land of grapes, it will profit us to make an inventory of such wild types as botanists consider to be distinct enough to be called species. This synopsis is reduced and adapted from the author's monograph of the Vitaceæ in Gray's Synoptical Flora, 1897 (Vol. i., Part i., Fascicle ii.).

VITIS. The Vine. Grape-vine. A widespread genus in the North Temperate zone, richest in species in North America. The species undergo marked adaptations to local conditions, and several of them hybridize freely, so that the study of them is perplexing; and the difficulty is increased by the fact that the foliage varies in character on different parts of the plant, and herbarium material cannot properly represent the fruit. The large viticultural interests of North America, outside of the hot-houses and the Pacific Slope and Mexico, have been developed within the century from the native species of grapes (chiefly *Vitis Labrusca* and *V. æstivalis*), and their hybrids with the Old World wine-grape (*Vitis vinifera*). The last is almost exclusively grown in California, and is sometimes inclined to be spontaneous. The genus naturally divides itself, in North America, into two groups,—the muscadines, and the true grapes.

I. MUSCADINIA, the muscadines. Bark bearing prominent lenticels, never shredding; nodes without diaphragms; tendrils simple; flower-clusters small and not much elongated; berries usually falling singly; seeds oval or oblong, without a distinct stipe-like beak.

Vitis rotundifolia, Michx. (Muscadine, Southern Fox-grape, Bullace or Bullit or Bull Grape.) Fig. 17, page 84. Vine with hard, warty wood, running even sixty to one hundred feet over bushes and trees, and in the shade often sending down forking ærial roots: leaves rather small to medium (2 to 6 inches long), dense in texture and glabrous both sides (sometimes pubescent along the veins beneath), cordate-ovate and not lobed, mostly with a prominent and sometimes an acuminate

point (but somewhat contracted above the termination of the two main side veins), the under surface finely reticulated between the veins, the teeth and the apex angular, coarse and acute, the basal sinus shallow, broad and edentate; petiole slender and (like the young growth) fine-scurfy, about the length of the leaf-blade: tendrils (or flower-clusters) discontinuous, every third node being bare: fruit-bearing clusters smaller than the sterile ones, and ripening from three to twenty grapes in a nearly globular bunch: berries falling from the cluster when ripe, spherical or nearly so and large (half inch to inch in diameter), with very thick and tough skin and a tough, musky flesh, dull purple in color without bloom (in the Scuppernong variety silvery amber-green), ripe in summer and early autumn; seeds $\frac{1}{4}$ - to $\frac{3}{8}$ -inch long, shaped something like a coffee berry.—Grows on river banks, swamps, and rich woodlands and thickets, S. Delaware to N. Florida and west to Kansas and Texas. Known to vineyardists chiefly as the parent of the Scuppernong. Has been hybridized with *V. Labrusca*, *V. rupestris*, and *V. vinifera*.

Vitis Munsoniana, Simpson. (Mustang Grape of Florida, Bird or Everbearing Grape.) Very slender grower, preferring to run on the ground or over low bushes, more nearly evergreen than the last, flowering more or less continuously: leaves smaller, thinner, and more shining, more nearly circular in outline and less prominently pointed; the teeth broader in proportion to the blade, and more open or spreading: clusters larger and more thyrses-like: berries a half smaller than in the last, and often more numerous, shining black, with a more tender pulp, acid juice, no muskiness, and thinner skin; seeds half smaller than in the last.—Dry woods and sands, Florida, at Jacksonville, Lake City, and southwards, apparently the only grape on the reef keys; also in the Bahamas. Difficult to distinguish from *V. rotundifolia* in herbarium specimens, but distinct in the field. Not in domestication.

II. EUVITIS, the true grapes. Bark without distinct lenticels, on the old wood separating in long thin strips and fibers; nodes provided with diaphragms; tendrils forked; flower-clusters mostly

large and elongated; berries usually not falling singly, but tending to shrivel and hang on the stem; seeds pyriform.

A. Green-leaved grapes, mostly marked at maturity by absence of prominent white, rusty, or blue tomentum or scurf or conspicuous bloom on the leaves beneath (under surface sometimes thinly pubescent, or minute patches of floccose wool in the axils of the veins, or perhaps even cobwebby); the foliage mostly thin: tendrils intermittent, i. e., every third joint bearing no tendrils (or inflorescence). *V. cinerea* and *V. Arizonica* are partial exceptions, and might be looked for in A A.

B. Vulpina-like grapes, characterized by thin light or bright green mostly glossy leaves (which are generally glabrous below at maturity except, perhaps, in the axils of the veins, and in *V. Champini*), with a long or at least a prominent point, and usually long and large, sharp teeth, or the edges even jagged.

C. Leaves broader than long, with truncate-oblique base (*V. Treleasei* might be sought here).

Vitis rupestris, Scheele. (Sand, Sugar, Rock, Bush, or Mountain Grape.) Shrub 2 to 6 feet high, or sometimes slightly climbing, the tendrils few or even none, diaphragms plane and rather thin: leaves reniform to reniform-ovate (about 3 to 4 inches wide and two-thirds as high), rather thick, smooth and glabrous on both surfaces at maturity, marked by a characteristic light glaucescent tint, the sides turned up so as to expose much of the under surface, the base only rarely cut into a well marked sinus, the margins very coarsely angle-toothed, the boldly rounded top bearing a short, abrupt point, and sometimes two lateral teeth enlarged and suggesting lobes: stamens in fertile flowers recurved laterally or rarely ascending, those in the sterile flowers ascending: cluster small, slender, open and branched: berries small ($\frac{1}{4}$ - to $\frac{1}{2}$ -inch in diameter), purple-black and somewhat glaucous, pleasant-tasted, ripe in late summer; seeds small and broad.—Sandy banks, low hills and mountains, District of Columbia and S. Pennsylvania to Tennessee, Missouri, and S. W. Texas. One or two varieties in cultivation, and it hybridizes freely. Promising for the experimenter.

Var. dissecta, Eggert, is a form with more ovate leaves and very long teeth, and a strong tendency towards irregular lobing.—Missouri.

cc. Leaves ovate in outline, with a mostly well marked sinus.

d. Diaphragms (in the joints or nodes) thin: young shoots not red; leaves not deeply lobed.

Vitis monticola, Buckley. (Sweet Mountain Grape.) A slender trailing or climbing plant (reaching 20 to 30 feet in height), with very long and slender branches, the young growth angled and floccose (sometimes glabrous), the diaphragms plane and rather thin: leaves small and thin (rarely reaching 4 inches in width, and generally from 2 to 3 inches high), cordate-ovate to triangular-ovate, with the basal sinus ranging from nearly truncate-oblique to normally inverted-U-shaped, rather dark green but glossy above and grayish green below, when young more or less pubescent or even cobwebby below, the blade either prominently notched on either upper margin or almost lobed, the point acute and often prolonged, margins irregularly notched with smaller teeth than in *V. rupestris*: clusters short and broad, much branched: berries medium or small (averaging about $\frac{1}{2}$ -inch in diameter), black or light colored, seedy, sweet; seeds large (about $\frac{1}{4}$ -inch long), and broad.—Limestone hills in S. W. Texas. This species has been the subject of much misunderstanding. Buckley's description seems to be confused, but his specimens of *V. monticola* (in Herb. Acad. Philad.) are clearly the small-leaved and glabrous species here designated. See, also, Viala, "Une Mission Viticole en Amerique," 1889, 67; and *V. Berlandieri*, below. The species has no value in its fruit, but it may be useful as a stock on limy soils.

Vitis vulpina, L. (Riverbank or Frost Grape.) Fig. 15, page 76.

A tall-climbing plant, with a bright green cast to the foliage, normally glabrous young shoots, large stipules, and very thin diaphragms: leaves thin, medium to large, cordate-ovate, with a broad but usually an evident sinus, mostly showing a tendency (which is sometimes pronounced) to three lobes, generally glabrous and bright green below, but the veins and their angles often pubescent, the margins vari-

ously, deeply and irregularly toothed and sometimes cut, the teeth and the long point prominently acute: fertile flowers bearing reclining or curved stamens, and the sterile ones long and erect or ascending stamens: clusters medium to large on short peduncles, branched (often very compound), the flowers sweet-scented: berries small (less than $\frac{1}{2}$ -inch in diameter), purple-black with a heavy blue bloom, sour and usually austere, generally ripening late (even after frost); seeds rather small and distinctly pyriform.—New Brunswick to N. Dakota, Kansas, and Colorado, and south to W. Virginia, Missouri, and N. W. Texas; the commonest grape in the northern states west of New England, particularly along streams. Commonly known as *Vitis riparia*. Variable in the flavor and maturity of the fruit. Forms with petioles and under surfaces of leaves pubescent sometimes occur. Occasionally hybridizes with *V. Labrusca* eastward, the hybrid being known by the tomentose young shoots and unfolding leaves, and the darker foliage which is marked with rusty tomentum along the veins of the less jagged leaves. Parent, either direct or crossed, of Clinton, Elvira, Pearl, and others.

Var. præcox, Bailey, is the June grape of Missouri, the little sweet fruits ripening in July.

In a note attached to his specimens (now at the Jardin des Plantes, Paris), Michaux speaks of this as being the species known to the French voyageurs upon the Ohio and Mississippi: "*Vitis riparia*.—Vigne des battures par les français qui voyagent sur l'Ohio & le Misissippi, parce que cette espece croit sur les rochers et les sables inondés annuellement, par les débordements. Le raisin en est le meilleur de tous ceux qui se trouvent, dans l'Amerique septentrionale. L'on ne trouve nullement cette espece a l'est des Monts Alleganies, Ohio & Misissippi. Le raisin est meur en Aoust et croit sur les Isles & sur les Rochers qui bordent les Rivieres Shavanon ou Cumberland, Cheroquis ou Tenassee, ainsi que sur les Rives de Green River, dans l'Etat de Kentucky. Il est plus difficile de trouver du Raisin sur les Isles ou plages sablonneuses du Misissippi et de l'Ohio parce qu'elles sont trop longtemps submergées."

There is a curious confusion respecting the name of this

species. Linnæus described a *Vitis vulpina* ("fox-grape") in 1753, and preserved specimens of it in his herbarium. Our grapes have been so much misunderstood that there have been various guesses at the identity of Linnæus' specimens. It has been thought that they represent the true fox-grape, or *Vitis Labrusca*. Again it was thought that they are the muscadine type, and the name *vulpina* was once used in place of Michaux's *rotundifolia* (page 98). Then for many years the name was dropped altogether. Finally Planchon, the most recent monographer of the genus, declared Linnæus' specimens to be the *Vitis riparia* of Michaux, although he did not substitute the name *vulpina* for the more recent *riparia*. Professor Britton later examined the specimens, and also pronounced them to be *V. riparia*. In the above monograph I therefore used the older name (*V. vulpina*). Since that time, however, I have myself examined Linnæus' specimens in London, and find that he had specimens of two species under the name of *vulpina*. On one sheet are two leaves, one marked *V. vinifera* and the other *V. vulpina*, both in Linnæus' hand. The former is the wine-grape (*V. vinifera*), and the latter is the river-bank grape (*V. riparia*). Another herbarium sheet, however, has a large flowering specimen, labelled, in Linnæus' hand, *V. vulpina*, and this is the frost-grape (*V. cordifolia*). It would have been better to have taken this latter specimen as Linnæus' type, and to have made the name *vulpina* supplant *cordifolia*; but since the other disposition has been made of the case, I shall not make the change.

Vitis Treleasei, Munson. Plant shrubby and much branched, climbing little, the small and mostly short (generally shorter than the leaves) tendrils deciduous the first year unless finding support, internodes short, the diaphragms twice thicker (about $\frac{1}{16}$ -inch) than in *V. vulpina* and shallow-biconcave: stipules less than one quarter as large as in *V. vulpina*: leaves large and green, very broad-ovate, or even reniform-ovate (often wider than long), thin, glabrous and shining on both surfaces, the basal sinus very broad and open and making no distinct angle with the petiole, the margin unequally notch-toothed (not jagged, as in *V. vul-*

pina), and indistinctly 3-lobed, the apex much shorter than in *V. vulpina*: fertile flowers with very short recurved stamens, sterile ones with ascending stamens: cluster small (2 to 3 inches long): the berries $\frac{1}{3}$ -inch or less thick, black with a thin bloom, ripening three weeks later than *V. vulpina* when grown in the same place; thin-skinned; pulp juicy and sweet; seeds small.—Brewster county, S. W. Texas, and New Mexico to Bradshaw Mountains, Arizona. Little known, and possibly a dry-country form of *V. vulpina*. In habit it suggests *V. Arizonica*, var. *glabra*, from which it is distinguished, among other things, by its decidedly earlier-flowering and larger leaves with coarser teeth and less pointed apex.

Vitis Longii, Prince. Differs from vigorous forms of *V. vulpina* in having floccose or pubescent young growth: leaves decidedly more circular in outline, with more angular teeth and duller in color, often distinctly pubescent beneath: stamens in fertile flowers short and weak and laterally reflexed, those in sterile flowers long and strong: seeds larger.—N. W. Texas and New Mexico. Regarded by French authors as a hybrid, the species *V. rupestris*, *vulpina*, *candicans*, and *cordifolia* having been suggested as its probable parents. It is variable in character. In most of its forms it would be taken for a compound of *V. rupestris* and *V. vulpina*, but the latter species is not known to occur in most of its range. It was very likely originally a hybrid between *V. rupestris* (which it sometimes closely resembles in herbarium specimens except for its woolliness), and some tomentose species (possibly with *V. Arizonica* or *V. Doaniana*), but it is now so widely distributed, and grows so far removed from its supposed parents, and occurs in such great quantity in certain areas, that for taxonomic purposes it must be kept distinct. It is not unlikely that it has originated at different places as the product of unlike hybridizations. Late French writers designate the jagged-leaved forms as *V. Solonis*, and the dentate forms as *V. Nuevo-Mexicana*. This interesting grape was found some thirty years ago by Engelmann in the Botanic Garden of Berlin, under the name of *Vitis Solonis*, without history. Engelmann guesses (Bushberg Cat. ed. 3, 18) the

name to be a corruption of "Long's." It is probable that the plant was sent to European gardens as *Vitis Longii*—very likely from Prince's nursery—and the name was misread on the label. The original name, which was duly published by Prince, with description, may now be restored. *Vitis Longii* is no doubt capable of yielding useful varieties for the Plains.

Var. microsperma, Bailey, is a very vigorous and small-seeded form, which is very resistant to drought.—Red River, N. Texas.

Vitis Champini, Planch. Probably a hybrid of *V. rupestris* or *V. Berlandieri* and *V. candicans*, bearing medium to large reniform or reniform-cordate leaves which are variously pubescent or cobwebby but become glabrous, the growing tips mostly white-tomentose: berries very large and excellent.—S. W. Texas. In some places associated with *V. candicans*, *V. Berlandieri*, and *V. monticola* only, and in others with the above and *V. rupestris*. Often found composing dense thickets. Very promising as a parent of horticultural varieties. (Fig. 18.)

DD. Diaphragms very thick and strong: young shoots bright red: leaves often strongly lobed.

Vitis palmata, Vahl. (Red or Cat Grape.) A slender but strong-growing vine, with small, long-jointed, angled, red, glabrous, herb-like shoots and red petioles: leaves small to medium, ovate-acuminate, dark green and glossy, sometimes indistinctly pubescent on the nerves below, the sinus obtuse, the blade either nearly continuous in outline or (commonly) prominently lobed or even parted, coarsely notched: stamens in the sterile flowers long and erect: clusters loose and long-peduncled, branched; the flowers opening late: berries small and late ($\frac{1}{4}$ - to $\frac{3}{8}$ -inch in diameter), black, with or without purple bloom, with little juice, and commonly containing but a single seed, which is large and broad.—A handsome plant; Illinois and Missouri to Louisiana and Texas. More promising as an ornamental plant than as a vineyard plant. The flesh is usually thin and the skin thick and tough, but the flavor is often vinous and good.

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BB. Cordifolia-like grapes, with thickish and dull-colored or grayish green leaves often holding some close dull pubescence below at maturity (and the shoots and leaves nearly

Fig. 18. Barnes grape. *Vitis Champini*. (Adapted from Munson.)

always more or less pubescent when young), the teeth mostly short or at least not deep-cut, the point mostly triangular and conspicuous.

C. Plant strong and climbing, with stout persistent tendrils.

D. Young shoots terete, and glabrous or very soon becoming so.

Vitis cordifolia, Michx. (True Frost Grape, Chicken, Raccoon,

or Winter Grape.) One of the most vigorous of American vines, climbing to the tops of the tallest trees, and sometimes making a trunk 1 or 2 feet in diameter: internodes long; the diaphragms thick and strong: petioles long; leaves long-cordate, triangular-cordate with a rounded base, or cordate-ovate, undivided but sometimes very indistinctly 3-lobed or 3-angled, the basal sinus rather deep and narrow and normally acute, the margin with large angular acute teeth of different sizes, and the point long and acute, the upper surface glossy and the lower bright green and either becoming perfectly glabrous or bearing some close and fine inconspicuous grayish pubescence on the veins: stamens erect in the sterile flowers and short reflexed-curved in the fertile ones: clusters long and very many-flowered, most of the pedicels branched or at least bearing a cluster of flowers: berries numerous and small (about $\frac{3}{8}$ -inch in diameter), in a loose bunch, black and only very slightly glaucous, late and persistent, with a thick skin and little pulp, becoming edible after frost; seeds medium and broad.—In thickets and along streams from Pennsylvania (and probably S. New York) to E. Kansas and southwards to Florida and Texas. It gives little promise to the experimenter.

Var. foetida, Engelm., has fetidly aromatic berries, and grows in the Mississippi Valley.

Var. sempervirens, Munson. A glossy-leaved form, holding its foliage very late in the season: leaves sometimes suggesting forms of *V. palmata*.—S. Florida.

Var. Helleri, Bailey. Leaves more circular (i. e., lacking the long point), and the teeth round-obtuse and ending in a short mucro.—Kerr county, S. Texas, 1,600 to 2,000 feet.

DD. Young shoots angled, and covered the first year with tomentum or wool.

Vitis Baileyana, Munson. ('Possum Grape.) Less vigorous climber than *V. cordifolia*, rather slender, with short internodes and very many short side shoots: petioles shorter and often pubescent; leaves frequently smaller, the larger ones shortly but distinctly 3-lobed (lobes mostly pointed and much spreading), bright green but not shining above and

gray below and pubescent at maturity only on the veins, the point only rarely prolonged and often muticous, the teeth comparatively small and notch-like and not prominently acute, sinus more open: floral organs very small; the stamens reflexed in the fertile flowers; pedicels short, making the bunch very compact: berries about the size of *V. cordifolia*, black and nearly or quite bloomless, late; seed small and notched on top.—Mountain valleys, 800 to 3,000 feet altitude, S. W. Virginia and adjacent West Virginia and W. North Carolina, Tennessee and N. Georgia; also at common levels in the uplands of West-central Georgia. The eastern counterpart of *V. Berlandieri*. Not promising for the cultivator.

Vitis Berlandieri, Planch. (Mountain, Spanish, Fall, or Winter Grape.) A stocky, moderately climbing vine, with mostly short internodes and rather thick diaphragms: leaves medium-large, broadly cordate-ovate or cordate-orbicular (frequently as broad as long), glabrous and glossy above, covered at first with gray pubescence below but becoming glabrous and even glossy except on the veins, the sinus mostly inverted-U-shaped in outline but often acute at the point of insertion of the petiole, the margin distinctly angled above or shortly 3-lobed and marked by rather large open notch-like acute teeth of varying size, the apex mostly pronounced and triangular-pointed: stamens long and ascending in the sterile flowers, laterally recurved in the fertile ones: clusters compact and compound, mostly strongly shouldered, bearing numerous medium to small ($\frac{1}{8}$ -inch or less in diameter) purple and slightly glaucous very late berries, which are juicy and pleasant-tasted; seed (frequently only one) medium to small.—Limestone soils along streams and hills, S. W. Texas and adjacent Mexico. Well marked by the gray-veined under surface of the leaves. No varieties in cultivation, and gives little promise in that direction, although it crosses with one or two other species; but valuable as phylloxera-proof stock on limy soils.

Vitis cinerea, Engelm. (Sweet Winter Grape.) Climbing high, with medium to long internodes and thick and strong diaphragms; leaves large, broadly cordate-ovate to triangular-

cordate-ovate (generally longer than broad), the sinus mostly wide and obtuse, the margin small-notched (teeth much smaller than in *V. Berlandieri*) or sometimes almost entire, mostly distinctly and divaricately 3-angled or shortly 3-lobed towards the apex, the triangular apex large and prominent, the upper surface cobwebby when young but becoming dull dark green (not glossy), the under surface remaining ash-gray or dun-gray webby-pubescent: stamens in sterile flowers long, slender and ascending, in the fertile ones short, and laterally recurved: cluster mostly loose and often straggling, containing many small black berries, these only slightly if at all glaucous, ripening very late, and after frost becoming sweet and pleasant; seeds small to medium.—Along streams, mostly in limy soils, central Illinois to Kansas and Texas and Mexico, also N. Florida. Readily distinguished from *V. æstivalis* by the triangular-topped sharply 3-lobed ash-gray leaves and the gray tomentum of the young growth. No varieties in cultivation, but it hybridizes with *V. rupestris* and *V. Linsecomii*.

Var. Floridana, Munson. Growing tips rusty-tomentose, as are sometimes the veins on the under sides of the leaves: cluster longer-peduncled and more compound.—Manatee county, Florida, and apparently also in Arkansas; not unlikely a compound with *V. æstivalis*, but the leaves have the characteristic shape of *V. cinerea*. Not to be confounded with any form of *V. Caribæa*, because of the lobed triangular-topped leaves and much larger teeth.

Var. canescens, Bailey. A form with rounded or heart-like leaves, the upper half of the leaf lacking the triangular and 3-lobed shape of the type.—St. Louis, Missouri, and S. Illinois, to Texas.

cc. Plant scarcely climbing, the tendrils perishing if failing to find support.

Vitis Arizonica, Engelm. (Cañon Grape.) Plant weak, much branched, with short internodes and thick diaphragms, branchlets angled: leaves mostly small, cordate-ovate and with a prominent triangular-pointed apex, the sinus broad or the base of the blade even truncate, the teeth many and small and pointed or mucronate, the margin either contin-

nous or very indistinctly 3-lobed (or sometimes prominently lobed on young growths), the leaves and shoots white-woolly when young, but becoming nearly glabrous with age: stamens ascending in sterile flowers and recurved in the fertile ones: bunches small and compound, not greatly, if at all, exceeding the leaves, bearing 20 to 40 small black berries of pleasant taste; seeds 2 to 3, medium size.—Along river banks, W. Texas to New Mexico and Arizona, mostly south of the 35th parallel, to S. E. California and N. Mexico. Not promising horticulturally

Var. glabra, Munson. Plant glabrous, with glossy and mostly thinner and larger leaves.—In mountain gulches and cañons, with the species and ranging northwards into S. Utah. Readily distinguished from *V. monticola* by its triangular-pointed and small-toothed leaves.

BBB. Orbicular-scallop-leaved species of the Pacific Coast.

Vitis Californica, Benth. Vigorous species, tall-climbing upon trees (Fig. 19), but making bushy clumps when not finding support, the nodes large and diaphragms rather thin: leaves mostly round-reniform (the broader ones the shape of a horse's hoof-print), rather thin, either glabrous and glossy or (more commonly) cottony-canescens until half grown and usually remaining plainly pubescent below, the sinus ranging from very narrow and deep to broad and open, the margins varying (on the same vine) from finely blunt-toothed to coarsely scallop-toothed (the latter a characteristic feature), the upper portion of the blade either perfectly continuous and rounded or sometimes indistinctly 3-lobed and terminating in a very short apex: bunches medium, mostly long-peduncled and forked, the numerous small berries glaucous-white, seedy and dry but of fair flavor; seed large ($\frac{1}{4}$ - to $\frac{5}{16}$ -inch long), prominently pyriform.—Along streams in central and N. California and S. Oregon. Leaves becoming handsomely colored and mottled in fall. Of small promise horticulturally.

AA. Colored-leaved Grapes, marked by thick or at least firm foliage, the leaves prominently rusty or white-tomentose or glaucous-blue below. *V. cinerea*, *V. Arizonica*, and possibly *V. Californica* may be sought here; and late-gathered forms of *V. bicolor* may be looked for in A.

- B.** Leaves only flocculent or cobwebby or glaucous below when fully grown (i. e., not covered with a thick, dense, felt-like tomentum, except sometimes in *V. Doaniana*).

Fig. 19. *Vitis Californica* growing on a stub over 50 feet high. Yallo Ballo Mountains, Cal. W. L. Jepson, 1897.

- c.** White-tipped grapes, comprising species with the ends of the growing shoots and the under surfaces of the leaves whitish or gray.

Vitis Girdiana, Munson. (Valley Grape.) Strong climbing vine, with thick diaphragms: leaves medium to large and rather thin, broadly cordate-ovate, with a rather deep and narrow sinus and nearly continuous or obscurely 3-lobed outline (sometimes markedly 3-lobed on young shoots), the teeth many and small and acute, the apex short-triangular or almost none, the under surface remaining closely ashy-tomentose: clusters large and very compound, each one dividing into three or four nearly equal sections, which are in turn shouldered and thyrsoid-like: berries small, black, and

slightly glaucous, the skin thin but tough, pulp finally becoming sweet; seeds medium in size, pyriform.—S. California, south of the 36th parallel. Differs from *V. Californica* in the more pubescent shoots and foliage, smaller and sharp teeth, decomposed clusters, smaller less glaucous berries, and smaller seeds. Shoots of *V. Californica* often bear leaves with small and muticous teeth, and such specimens without the flower-clusters are difficult to distinguish from this species. Some of the forms which have been referred to *V. Girdiana* are evidently hybrids with the wine-grape, *V. vinifera*; and at best the plant is imperfectly understood and its merits as a species are yet to be determined.

Vitis Doaniana, Munson. Plant vigorous, climbing high or remaining bushy if failing to find support, with short internodes and rather thin diaphragms: leaves bluish green in cast, mostly large, thick and firm, cordate-ovate or round-ovate in outline, bearing a prominent triangular apex, the sinus either deep or shallow, the margins with very large angular notch-like teeth and more or less prominent lobes, the under surface usually remaining densely pubescent and the upper surface more or less floccose: cluster medium to small, bearing large ($\frac{5}{8}$ -inch and less in diameter), black, glaucous berries of excellent quality; seeds large ($\frac{1}{4}$ - to $\frac{3}{8}$ -inch long), distinctly pyriform.—Chiefly in N. W. Texas, but ranging from Greer county, Oklahoma, to beyond the Pecos River in New Mexico. The species varies greatly in pubescence, some specimens being very nearly glabrous at maturity and others densely white-tomentose. The plant would pass at once as a hybrid of *V. vulpina* and *V. candicans*, except that the former does not often occur in its range. It is very likely a hybrid, however, and *V. candicans* seems to be one of the parents. Promising as a parent of varieties for the dry regions.

cc. Rusty-tipped grapes, comprising the æstivalian group, the unfolding leaves and (except in *V. bicolor*) the young shoots distinctly ferrugineous, and the mature leaves either rusty or bluish below, or sometimes becoming green in *V. bicolor*.

Vitis æstivalis, Michx. (Summer, Bunch, or Pigeon Grape.)

Strong, tall-climbing vine, with medium-short internodes, thick diaphragms, and often pubescent petioles: leaves mostly large, thinnish at first but becoming rather thick, ovate-cordate to round-cordate in outline, the sinus either deep (the basal lobes often overlapping) or broad and open, the limb always lobed or prominently angled, the lobes either 3 or 5, in the latter case the lobal sinuses usually enlarged and rounded at the extremity, the apex of the leaf broadly and often obtusely triangular, the upper surface dull and becoming glabrous and the under surface retaining a covering of copious rusty or red-brown pubescence which clings to the veins and draws together in many small tufty masses: stamens in fertile flowers reflexed and laterally bent: clusters mostly long and long-peduncled, not greatly branched or even nearly simple (mostly interrupted when in flower), bearing small ($\frac{1}{8}$ -inch or less in diameter), black, glaucous berries, which have a tough skin, and a pulp ranging from dryish and astringent to juicy and sweet; seeds medium size ($\frac{1}{4}$ -inch or less long), two to four.—Chemung county, New York, and Long Island to central Florida, and westward through S. Pennsylvania to the Mississippi and Missouri. A marked type among American grapes, being readily distinguished from other species by the reddish fuzz of the under sides of the leaves. Most of the tomentose-leaved species have been at one time or another confounded with it, but when allowed to stand by itself, it is not a difficult species to understand. *Vitis æstivalis* has given rise to more cultivated varieties than any other species except *V. Labrusca* (see page 81). Michaux's original specimens are well preserved in Paris, and they have been properly understood by American botanists. (See Fig. 16, page 82.)

Var. glauca, Bailey. Leaves (and mature wood) glaucous-blue on the body beneath, but the veins rusty: berries and seeds larger. S. W. Missouri to N. Texas. Much like *V. bicolor*, but leaves thicker and more pubescent below, and tips of shoots rusty-tomentose.

Var. Linsecomii, Munson. (Post-oak, Pine-wood, or Turkey Grape.) More stocky than *V. æstivalis*, climbing high upon trees but forming a bushy clump when not finding support:

leaves densely tomentose or velvety below: berries large ($\frac{1}{3}$ - to $\frac{3}{4}$ -inch in diameter), black and glaucous, mostly palatable; seeds mostly much larger than in *V. æstivalis* (often $\frac{3}{8}$ -inch long).—High post-oak (*Quercus stellata*) lands, S. W. Missouri to N. Texas and E. Louisiana. Very likely derived from the *æstivalis* type through adaptation to dry soils and climates. Perhaps worth recognition as a geographical species. Of great promise to the cultivator.

Var. Bourquiniana, Bailey. A domestic offshoot, represented in such cultivated varieties as Herbemont and Le Noir, differing from *V. æstivalis* in its mostly thinner leaves, which (like the young shoots) are only slightly red-brown below, the pubescence mostly cinereous or dun-colored or the under surface sometimes blue-green: berries large and juicy, black or amber-colored.—A mixed type, some of it probably a direct amelioration of *V. æstivalis*, and some hybridized with the wine-grape (*V. vinifera*). Much cultivated South, and the parent of many excellent varieties (see page 81), which Munson (Texas Farm and Ranch, Feb. 8, 1896) arranges in two sections,—the Herbemonts and the Devereuxs.

Vitis bicolor, LeConte. (Blue Grape, or Summer Grape of the North.) A strong, high-climbing vine, with mostly long internodes and thick diaphragms, the young growth and canes generally perfectly glabrous and mostly (but not always) glaucous-blue, tendrils and petioles very long: leaves large, round-cordate-ovate in outline, glabrous and dull above and very heavily glaucous-blue below, but losing the bloom and becoming dull green very late in the season, those on the young growth deeply 3-5-lobed, and on the older growths shallowly 3-lobed, the basal sinus running from deep to shallow, the margins mostly shallow-toothed or sinuate-toothed (at least not so prominently notch-toothed as in *V. æstivalis*): cluster mostly long and nearly simple (sometimes forked), generally with a long or prominent peduncle: the purple and densely glaucous berries of medium size ($\frac{1}{2}$ -inch or less in diameter), sour but pleasant-tasted when ripe (just before frost); seeds rather small.—Abundant northwards along streams and on banks, there taking the place of *V. æstivalis*. Ranges from New York

and Illinois to the mountains of W. North Carolina, and to W. Tennessee. Well distinguished from *V. æstivalis* (at least in its northern forms) by the absence of rufous tomentum, the blue-glaucous small-toothed leaves, and long petioles and tendrils. It has been misunderstood because it loses its glaucous character in the fall. Of small promise horticulturally.

Vitis Caribæa, DC. Climbing, with flocculent-woolly (or rarely almost glabrous) and striate shoots; tendrils rarely continuous: leaves cordate-ovate or even broader, and mostly acuminate-pointed, sometimes obscurely angled above (but never lobed except now and then on young shoots), becoming glabrous above but generally remaining rufous-tomentose below, the margins set with very small micro-tipped sinuate teeth: cluster long and long-peduncled, generally large and very compound: berry small and globose, purple; seed obovate, grooved on the dorsal side.—A widely distributed and variable species in the American tropics, running into white-leaved forms (as in *V. Blancoi*, Munson). Little known in the United States: Louisiana, Lake City, N. Florida; swamp, near Jacksonville, Florida.

BB. Leaves densely tomentose or felt-like beneath throughout the season, the covering white or rusty white.

c. Tendrils intermittent (every third joint with neither tendril nor inflorescence opposite).

Vitis candicans, Engelm. (Mustang Grape.) Plant strong and high climbing, with densely woolly young growth (which is generally rusty tipped), and very thick diaphragms: leaves medium in size, and more or less poplar-like, ranging from reniform-ovate to cordate-ovate or triangular-ovate, dull above but very densely white-tomentose below and on the petioles, the basal sinus very broad and open or usually none whatever (the base of the leaf then nearly truncate), deeply 5-7-lobed (with enlarging rounded sinuses) on the strong shoots and more or less indistinctly lobed or only angled on the normal growths, the margins wavy or sinuate-toothed: stamens in the sterile flowers long and strong, those in the fertile flowers very short and laterally reflexed: cluster small, mostly branched, bearing a dozen to twenty

large ($\frac{3}{4}$ -inch or less in diameter) purple or light-colored or even whitish berries, which have a thick skin and a very disagreeable, fiery flavor; seeds large, pyriform.—E. Texas, mostly on limestone soils. Not promising to the experimenter.

Var. coriacea, Bailey. (Leather-leaf or Calloosa Grape.) Differs from the species chiefly in bearing much smaller (about $\frac{1}{8}$ -inch in diameter), thinner-skinned, and more edible grapes, with mostly smaller seeds, and perhaps a less tendency to very deep lobing in the leaves on young shoots, and possibly rather more marked rustiness on the young growths.—Florida, chiefly southward, in which range various Texan plants reappear. The more agreeable quality of the fruit is probably the result of a more equable and moister climate. More promising than the species.

Vitis Simpsoni, Munson. Distinguished by mostly much-cut leaves on the young shoots, and comparatively thin, large, and large-toothed ones on the main shoots, rusty white tomentum below and very prominently brown-tomentose young growths,—the character of the leaves and tomentum varying widely, the foliage sometimes becoming almost blue-green below.—Central Florida: Lake county; Manatee River, etc. This is likely a hybrid of *V. æstivalis* and *V. candicans*, var. *coriacea*. Some forms of it are very like *V. Labrusca*, and might be mistaken for that species.

cc. Tendrils mostly continuous (a tendril or inflorescence opposite every node).

Vitis Labrusca, L. (Fox Grape, Skunk Grape.) Fig. 11, page 58. A strong vine, climbing high on thickets and trees; young shoots tawny with much scurfy down: leaves large and thick, strongly veined (especially beneath), broadly cordate-ovate, mostly obscurely 3-lobed towards the top (on strong growths the sinuses sometimes extending a third or even half the depth of the blade, and rounded and edentate at the bottom) or sometimes nearly continuous in outline and almost deltoid-ovate, the petiolar sinus mostly shallow and very open (ranging to narrow and half or more the length of the petiole), the margins shallowly scallop-toothed with mucro-pointed teeth (or sometimes almost entire), and the apex

and lobes acute, the upper surface dull green and becoming glabrous, but the lower surface densely covered with a tawny white, dun-colored or red-brown tomentum: stamens long and erect in the sterile flowers and (in wild forms) short and recurved in the fertile ones: raceme short (berries usually less than 20 in wild types), generally simple or very nearly so, about the length of the peduncle when in flower: berries large and nearly spherical, ranging from purple-black (the common color) to red-brown and amber-green, generally falling from the pedicel when ripe, variable in taste but mostly sweetish musky and sometimes slightly astringent, the skin thick and tough; seeds very large and thick.—New England and southwards in the Alleghany region and highlands to West-central Georgia. Not known to occur west of E. New York in the North, except at the southern end of Lake Michigan (*E. J. Hill*), and in S. Indiana, by Munson. The parent of the greater part of American cultivated grapes. It is often confounded with *V. æstivalis* in the South, from which it is distinguished by the habitually continuous tendrils, the more felt-like leaves which are not floccose, and especially by the small-toothed leaves, very short clusters and large berries and seeds. *Vitis Labrusca* is the parent stem of the greater part of American grapes. It is well represented in Catawba, Concord and Worden. In its wild state it is very variable in size, color and quality of fruit, and in size of cluster. Its berries tend to fall from the stem, and the "shelling" of grapes in vineyards may be a lingering of this ancestral trait. See Munson, in *Amer. Gard.*, xii. 580.

American Grape Literature

The best illustration of the high part which the grape has played in the industrial development of the country, is afforded by a survey of the voluminous literature of the subject. Probably no less than a hundred books, counting the various editions, have been published in this country on the grape. The

following catalogue of the volumes of this American literature which are in the author's library at the moment this volume goes to press (excluding works devoted exclusively to wines), will give the reader a good idea of this species of writing :

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BUSH & SON & MEISSNER. Illustrated Descriptive Catalogue of American Grape Vines. A Grape Growers' Manual. 3rd ed. St. Louis : R. P. Studley & Co. Copyr. 1883. 1883. Illustr. Pp. 153.

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CHORLTON, WILLIAM. The American Grape Grower's Guide. Intended especially for the American climate. Being a practical treatise on the cultivation of the grape vine in each department of hothouse, cold grapery, retarding house, and outdoor culture. With plans for the construction of the requisite buildings, and giving the best methods of heating the same. New York : C. M. Saxton & Co. Copyr. 1852. 1856. Illustr. Pp. 171.

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II

THE STRANGE HISTORY OF THE MULBERRIES

WHEN the history of American agriculture shall be written, the record of the many attempts to raise silk-worms and to establish a great silk-growing industry will form an important and suggestive chapter. Sketches of these attempts have been made from time to time, but there still lacks any full collation of the subject with collateral events. The literature of American silk-growing from the manufacturer's side, however, is as extensive and satisfactory as that of any other agricultural-manufacturing industry. It is not my purpose to explore these interesting fields, but rather to present a rapid view of the rise and extent of mulberry-planting, more especially in the earlier days, and then to make observations on the subsequent evolution of the mulberry fruits,—a subject which, strangely enough, has escaped the attention both of botanists and of writers.

Summary Sketch of the Early Silk Industry

We have seen (page 10), when reviewing the early attempts at grape culture, that "silke worme seed" was sent to Virginia in 1621 by the London Company, along with grape vines. If we were to

trace the history of the attempts to raise silk in the New World, we should find that it is intimately associated with the efforts to grow the European types of grapes and to make wine. But the experiments in silk culture were even more persistent, and they were frequently the subjects of legislative encouragement and regulation. The very early efforts in Virginia were largely instigated by James I., whose insistence upon the feasibility of raising silk in England is as well known as his strenuous efforts to discourage the cultivation of tobacco in Virginia. The earliest writing directed to any special crop in the New World was devoted to the raising of silk, and independent books and monographs have continued to appear until our own time. Justin Winsor's "Narrative and Critical History" records that "The King addressed a letter to the Earl of Southampton with a review of Bonceil's treatise on the making of silk, and this was published by the Company in 1622. * * *

The Company also published, in 1629, Observations * * * of Fit Rooms to keepe silk wormes in."

In 1650, Edward Williams, under the signature of "E. W. Gent.," wrote an essay on Virginia, in which is an account of "The Discovery of Silk-worms, with their benefit. And Implanting of Mulberry Trees. Also the Dressing of Vines, for the rich Trade of making Wines in Virginia." After painting a vivid picture of the profit of silk-growing in China, Persia and other countries, he rises to Virginia and its marvellous great wild silk-worms, "a Countrey which Nature hath no lesse particularly assigned for the production, food and perfection of this Creature then Persia or China, stored naturally with infinities of Mulberry-

trees, some so large that the leaves thereof have by Frenchmen beene esteemed worth 5l. in which the indigenall and naturall Worme hath beene found as bigge as Wallnuts." Williams recalls that Virginia "is parallell with China, and the happiest Countries of the East and Western World in scituation," and it is "comparable to Persia." It is little wonder, then, that he should foresee that the colony was destined to be one of the greatest silk-producing countries of the world, particularly as the experiment had not yet been fully tried.

But Williams was not alone in these fertile prophecies of Virginia. The writings of most of his contemporaries, touching the climate and natural resources of this new land, can be compared to nothing else than the burning pictures which have been painted of our Pacific coast within our own time. Nothing was impossible in Virginia and the adjoining lands to the southward. Here, in Virginia, the sugar-cane, cotton, indigo, ginger, rice and pepper, may grow alongside "all the Spiceryes of the Phillippines"; corn (grain) will yield two or three harvests in the season; there are riches in copper and iron ore, "with great probability of a Golden Mine"; the native fruits "are various and delicate"; the fishes "for number and tast comparable to any other"; the beasts are many, of excellent flesh, "the Hides of divers usefull, and the Furies extraordinary rich"; in short, as Williams thinks of it, "Virginia duly considered for exactnesse of temperature, goodnesse of soyle, variety of Staples, and capability of receiving what ever is produced in any other part of the World, gives the right hand of preheminance to no Province under Heaven."

In this abounding new country, all the rural schemes which had proved to be visionary in England could be expected to thrive. One of the most inflated of all these instructions for the betterment of the colony was a treatise by Samuel Hartlib, published in 1655, called "The Reformed Virginian Silk Worm." The most remarkable part of this book is a letter "wherein the Experiment of a vertuous Lady of this Nation for the breeding of Silk-worms, is addressed unto the Planters of Virginia."* This lady sets herself before the reader in a most ambitious introduction: "Hearken wel you beloved Planters, to what in these few lines I shall declare unto you; and is thus sent you in Print, that all of you may communicate the great and superlative good and benefit will be unto every one of you: *who so is wise, will ponder these things*, and give praise and glory to God, the Author of all good Inventions, how Providence having brought this to pass for all your exceeding great happiness and increase of store of wealth, with so much ease, so little labour, no cost unto you; and in so short a time as fourty daies, this wealth flowes in upon you. * * * She hath I say this Spring found out (by the speciall blessing of God upon her intentions) so rare, so speedy, and so costless a way and means for the feeding of Silkwormes; by the triall and experiment she so luckily made, to the admiration of all that have seen or heard of it, as a thing scarce credible; because not heretofore thought of, nay, as it were, held impossible by such

*Hartlib was a prominent man of his time, and made what is probably the first definite plan for a school of agriculture. See a brief sketch of the man and a summary of his "Essay for the Advancement of Husbandry-Learning," 1651, in *Garden and Forest*, vol. x., p. 168.

Authours as have written of the ordering and feeding of Silkworms: that this her invention being thus made known unto you, her beloved friends in Virginia, she is most confident, and assures herself you will all there instantly, without further delay (which will be the joy of her heart) become great and rich Masters of this noble Silk-work to all your unspeakable wealth." With dramatic art, she delays the unfolding of her wonderful secret until the torrent of appetizing sentences has roused the curiosity to the highest pitch. Now she is ready, and the reader is eager: "In the beginning of May last 1652, when her young Mulberry-tree in her Garden began to put out its buds, then her Silkworm-eggs began to hatch, as the nature of this wise creature is, when her food begins once to appear, she comes forth of her shell: she presently laying a Mulberry-leave upon these little crawling creatures, they came all upon it instantly; then she carried the leaf and them upon it to the tree, upon whose leaves they made hast to be; and there they day and night fed themselves, creeping from leafe to leafe, and branch to branch at their own liberties most pleasing to themselves; they grew and thrived wonderfully, and surpassed in largness of body those other wormes she kept in her chamber (she having been many a year a Mistris of Silkworms, and kept them by the Book-rules) this good and prosperous beginning heightened her hopes. The wormes, as their nature is, cast off or slipped out of their skins four severall times, still growing greater and greater to the singular delight and contents of their Mistris. About 45 dayes thus feeding upon the leaves, they began that rare and glorious work of spinning their Silk-bottomes upon the leaves and branches

of the tree ; such a gallant sight to behold, it ravished the Spectators, and their Mistris joy was crowned with excess of happiness herein and hereby, apparently finding the incomparable felicity this would prove to her dearly beloved Virginia, (for so you must give her leave to call it,) for she concluded, and so must all you, that this being thus effected in England, how much more with assured confidence will the wormes live, feed, and spin in Virginia ? she upon serious and due consideration of this thing, gave God hearty and humble thanks." All of which means that, although it was customary then, as now, to feed worms on picked leaves, the worms will nevertheless live and thrive, under congenial conditions, upon the tree itself !

A book of such prophetic tendencies must, of course, end in poetry. The first georgic, written by John Ferrar, is dedicated to "the most Noble, Virginian natural Silk-Worm her wonderful, various, plentiful food ; The infinite, speedy, great wealth she will produce to her protectors ; (in 45. days the time of her feeding) with small labour, cost, or skill, (learnt in an houres space by any child.) The singular aptness of that rare Superlative Climate, in Breeding them on so many several kinds of Trees in her Woods where they live, Feed and Spin, their mighty large, strange, double-bottoms [cocoons] of Silk : To the admiration of this our Old World ; but to the exaltation and glory of incomparable Virginia, in the New."

* * * * *

"Many a man the causes faine would heare,
How these rare Worms came first or still come there.
Insects produced are by heat and moisture
Who in strange shapes and formes do oft appeare.

In Spring our trees the Caterpillers reare ;
 Their trees likewise these noble creatures beare.
 And some proceed from eggs that scaped are
 From their enemies sight, which thing is rare.
 They feed not only on the Mulberry
 Which in our World sole food is held to be
 For all such precious Worms of that degree:
 But Poplar, Plum, Crab, Oake, and Apple tree,
 Yea Cherry, and tree called Pohickery:
 So on the Shrubs and Bushes feed full many
 Her Worms are huge whose bottoms dare
 With Lemmons of the largest size compare."

* * * * *

The grand conclusion of the book disports in human
 worms :

"HOMO VERMIS

Wee all are creeping Worms of th' earth,
 Some are Silk-Worms great by birth,
 Glow-Worms some that shine by night,
 Slow-Worms others, apt to bite,
 Some are Muck-Worms, slaves to wealth,
 Maw-Worms some that wrong the health,
 Some to the publique no good willers,
 Cancker-Worms and Cater-pillers;
 Found about the earth wee'r crawling,
 For a sorry life wee'r sprawling,
 Putrid stuff we suck, it fills us,
 Death then sets his foot and kills us."

The details of the early silk experiments are so many that we cannot follow them further with profit, but some of the leading events must be noted. James I. attempted to compel the London Company to grow silk in Virginia. The Company imposed "a fine of ten pounds of tobacco upon every planter who did not cultivate at least ten mulberry trees for every

100 acres of his estate," writes Brockett in his "Silk Industry in America." "This was in 1623, and for some time the business went on well." Under Sir William Berkeley's governorship (beginning in 1641), "a Reward of fifty Pounds of Tobacco was given for each Pound of Silk," according to Robert Beverley; and "all Persons were enjoin'd to plant Mulberry-Trees, for the food of the Silk-worm, according to the Number of Acres of Land they held." The industry thrived for a time, and a little silk is said to have been exported to England about the middle of that century. Some or all of the bounties were removed, at least for a time, in 1666, because the industry was considered to be well established; but tobacco was so much more profitable that it soon eclipsed every other crop. Robert Beverley, writing upon "The Present State of Virginia" in 1720, recalls "how formerly there was Incouragement given for making of Linen, Silk, etc., and how all Persons not performing several things towards producing of them were put under a Fine: But now all Incouragement of such things is taken away or intirely dropt by the Assemblies, and such Manufactures are always neglected when Tobacco bears anything of a Price."

The efforts to grow silk in the New World did not stop with Virginia. With the founding of Carolina and Georgia the attempt was made with all the vigor which characterized the early experiments along the James River. In fact, the best conceived and most persistent scheme for silk-raising appears to have been that which was set on foot in Georgia. The designs of the trustees of the colony, as told by Stevens in his "History of Georgia," "comprised

three points: to provide an asylum for the poor debtor and persecuted Protestant; to erect a silk, wine, and drug-growing colony; and to relieve the mother country of an overburdened population." It was estimated that the silks imported into England from Italian, French, Chinese and other sources, amounted to five hundred thousand pounds a year at the time of the colonization of Georgia, about 1732 to 1735. "With this Georgia will abundantly supply us," the account of the secretary of the trustees runs, "if we are not wanting to ourselves, and do not neglect the opportunity which Providence has thrown into our hands. The saving of this five hundred thousand pounds per annum is not all; but our supplying ourselves with raw silk from Georgia carries this further advantage along with it, that it will provide a new or additional employment for at least twenty thousand people in Georgia, for about four months in the year, during the silk season; and at least twenty thousand more of our poor here, all the year round, in working the raw silk, and preparing such manufactures as we send in return; or to purchase the said raw silk in Georgia, to which country our merchants will trade to much greater advantage than they can expect to do in Italy." The first colonial seal represented silk-worms upon one of its faces.*

*Although this seal is described in various histories, I have been unable to find a print of the side bearing the silk-worms. None is in the collection of Colonel Jones, the author of the history, nor of Otis Ashmore, an authority on the seals of Georgia. Mr. Ashmore published a history of all the seals of Georgia in the *Morning News* of Savannah, April 15, 1894. See, also, Jones' *History of Georgia*, p. 97. It is probable that no impression of this side of the seal exists in this country, and it is presumed that Colonel Jones obtained his information concerning it from the British Colonial Office. Another seal was subsequently made.

Sir Thomas Lombe, an eminent silk manufacturer in England, appears to have been the leading agitator of the silk industry for Georgia. Oglethorpe was thoroughly convinced of the practicability of the industry. The trustees secured Italian silk-growers to accompany the colonists. Encouraging results were soon reached. Samples of raw silk began to be received in England. "In May, 1735," writes Jones in his "History of Georgia," "the trustees, accompanied by Sir Thomas Lombe, exhibited a specimen to the Queen, who desired that it should be wrought into a fabric. This was done, and Her Majesty was so much pleased with the manufactured silk that she ordered it to be made up into a costume, in which she appeared at Court on her birthday." In or about 1750, Pickering Robinson was sent from England to France for the purpose of inspecting the growing and manufacture of silk, and upon his return, the trustees of the colony despatched him to Georgia, upon a salary of one hundred pounds a year and an allowance of twenty-five pounds for a clerk, to assume charge of the silk industry. Operations were begun at Savannah in 1751, and in order to encourage the growing of silk, the most exorbitant bounties were offered for cocoons. Despite all the forced and statutory encouragement, the silk industry did not return the money expended upon it, although the annual production of the raw product reached many hundred pounds for a number of years. As tobacco had gained the supremacy in Virginia, so rice and cotton soon became the dominant industries in Georgia; the troubles with the mother country depressed the markets for silk, and after 1766 silk-growing rapidly declined.

There was one apparent exception to this decay and unprofitableness of the silk industry, and this was among the Salzburgers, a settlement of German Protestants, who came to Georgia in 1734, and settled twenty-five miles above Savannah, at Ebenezer. Under the care of their pastor, John Martin Bolzius, the silk culture of the settlement attained to much prominence. "In 1736," writes Rev. P. A. Strobel, historian of the Salzburgers, "mulberry trees were planted at Ebenezer under the direction of Mr. Bolzius, and the Salzburgers were among the first and most successful in carrying out the wishes of the trustees in this particular. In 1742, five hundred trees were sent to Ebenezer, and a machine was erected for preparing the silk. In 1745 and 1746, specimens were sent to England, and in 1748, four hundred and sixty-four pounds were produced. In 1749, the trustees authorized Mr. Bolzius to erect ten sheds and ten machines for reeling, and other means necessary to carry on the manufacture. In 1750, nearly all the colonists had abandoned the experiment of silk-raising, except the Salzburgers. They persevered, and every year became more skilled in the business, and in 1751, they sent over to England a thousand pounds of cocoons and seventy-four pounds two ounces of raw silk, yielding the handsome sum one hundred and ten pounds sterling, or upwards of five hundred dollars, the price being at that time thirty shillings per pound. * * * Many mulberry-trees are still [1855] standing at Ebenezer, which no doubt have sprung from the original stock; and many of the descendants of the Salzburgers continue to raise silk, which they manufacture into fish-

ing-lines, and sell very readily in Savannah." These thrifty Germans continued the production of silk until the very eve of the Revolution. As late as 1772, they sent to England four hundred and eighty-five pounds of raw silk, and it is recorded that "some persons in almost every family there understand its process from the beginning to the end."

But the doom of the southern silk industry, which had been portended by the rise of cotton and rice and other interests, as well as by restriction of climate, was finally set by the American Revolution. The trustees of the colony, according to Charles C. Jones, Jr., had "seriously misinterpreted" the agricultural capabilities of Georgia. "Although substantial encouragement had been afforded to Mr. Amatis, to Jacques Camuse [Italian silk-growers], to the Salzburger at Ebenezer, and to others; although copper basins and reeling machines had been supplied and a filature erected; although silk-worm eggs were procured and mulberry trees multiplied,—silk culture in Georgia yielded only a harvest of disappointment."

The center of activity in the silk industry was now transferred to the northward. About 1760, silk worm eggs and mulberry trees began to be planted in Connecticut, and there soon arose in that state the most important—because the most nearly self-sustaining—silk-growing industry which has yet been seen in America. The industry was greatly encouraged by the writings of Jared Eliot, an able preacher and naturalist, whose memory is preserved to us, amongst other ways, in his excellent "Essays upon Field Husbandry," which appeared at sundry times from 1747 to 1759. He lived from 1685 to 1763. He was

grandson of the apostle Eliot. In 1762 he wrote "An Essay on the Invention or Art of Making very good Iron from black Sea Sand." Drake, in his "Dictionary of American Biography," says that Eliot "was the first to introduce the white mulberry-tree into Connecticut, and with it the silk-worm, and published a treatise upon the subject." Such a treatise is unknown to bibliographers, so far as I can learn. It is probably the sixth and last essay in Eliot's "Field Husbandry," published in 1759. I am the fortunate possessor of this rare and interesting work, but nothing is said in this particular essay about the original introduction of the mulberry into Connecticut. In fact, the essay speaks of the tree as being well known, and silk had been made in the colony. Eliot urges the growing of silk with much enthusiasm, and aside from the main object, he sees the following subsidiary advantages of planting mulberry trees: they may be planted in places which are not used for tilled crops; they produce fire wood, "which is much wanted in our old towns;" they may afford timber; "they are worth planting for Shade, Ornament and Beauty;" may be used for hedges; they yield fruit,—"the white Mulberry Tree bears abundance more Fruit, than the black; in *Italy*, where they abound in these Trees, they fatten their Swine and Poultry with the Fruit; the Writers say, that the Pork raised in this Manner, is exceeding good; what is made by this Means costs nothing, for the Hogs are their own Carvers; the Flesh raised this Way, is a clear Gain, like our Wood fed Pork. I apprehend that a better Improvement of the Fruit would be, to make artificial Wine; what is now made in the Country is from Cherries, and Cur-

rants; but, as the Fruit is sour, it requires a great deal of Sugar to make it good, which is an heavy Weight upon that Manufacture; but as the Juice of Mulberries is very sweet, especially the white Sort, I cannot but think, that from these, very good artificial Wine may be made, without any, or with very little Sugar; what is Sweet has a spiritous Strength, in Proportion to the Degree of Sweetness; Honey will make strong Metheglin, and Molasses makes Rum." The mulberry may be made to afford groves,—“proper Places for Retirement, Study, and Meditation; this will have Weight with those who love Contemplation, those who are wise and good; he that is not Company for himself, when alone, will be none of the most pleasing, or edifying Company for others.”

Eliot says that “The Society established at London, for the encouragement of Arts, Manufactures, and Commerce,” offered premiums for the production of silk in North America, and “pointed out Georgia, Pennsylvania, and Connecticut” as the most promising colonies in which the undertaking might be prosecuted. The Rev. Samuel Pullett’s “Culture of Silk” for the “Use of the American Colonies,” published in London in 1758, is a further evidence of the desire of the mother country to foster this new industry.

Rev. Dr. Stiles, subsequently president of Yale College, was also early interested in promoting the raising of silk, and he aided in obtaining from the legislature an offer of a bounty of ten shillings for every hundred mulberry trees of three years’ standing, and another of three pence per ounce for all raw silk produced in the colony. The production of silk was so great in Connecticut that for many years the valua-

tion of it was from \$100,000 to \$200,000 per annum. Its production persisted throughout the Revolution, and even into this century. The chief reason of the continuance of the business in Connecticut seems to have been that the silk was used almost wholly in domestic manufacture, and therefore did not need the English market to keep it alive.*

In most or all of the eastern states silk culture has been undertaken, particularly in the colonial period. Of the fabrics made of this silk, Mr. Brockett speaks as follows: "We find instances, occasionally, * * * of some delegate to the Colonial Assembly coming thither with a silk waistcoat or handkerchiefs made from silk of his own raising, and woven in his own house; or of some grand lady appearing at a reception of the Colonial Governor or in a public assembly, clad in a gown woven from native-grown silk. In either case, the fabrics were greatly praised; yet it must be confessed that, as compared with the silks of our own time, they were very imperfect goods, and would be scouted by our belles and beaux as unworthy to be worn."

The "Multicaulis Craze"

Although the interest in the growing of silk had greatly subsided before the close of the last century, it had not completely died out. Here and there a local interest survived, and carried over the memory

*Persons who are interested in the early ideas respecting the species of silk worms, should consult Moses Bartram's "Observations on the Native Silk Worms of North America," 1768, published in Trans. Amer. Phil. Soc. i., 2nd ed. 294.

of the old ambitious experiments and served as a stimulus to the inception of an enterprise which set the country aflame in the early part of the present century. In 1806, for example, Frederick Pursh, a botanical traveler, found mulberries cultivated in orchards near Cayuga Lake, N. Y., "may be for the raising of silk worms, as the trees were low and planted in regular close rows." The particular event which seems to have awakened general interest in this second silk enterprise, was the report of the Committee on Agriculture of the House of Representatives, in 1826, respecting the imports of silks and the exports of bread stuffs. These imports were increasing with wonderful rapidity, while the exports were decreasing in like ratio. This committee took the matter up in pursuance of a resolution introduced into the House on the 29th of December, 1825, by Mr. Miner: "*Resolved*, That the Committee on Agriculture be instructed to inquire whether the cultivation of the mulberry tree, and the breeding of silk worms, for the purpose of producing silk, be a subject worthy of legislative attention; and should they think it to be so, that they obtain such information as may be in their power, respecting the kind of mulberry tree most preferred, the best soil, climate, and mode of cultivation, and probable value of the culture, taking into view the capital employed, the labor, and the product, together with such facts and opinions as they may think useful and proper." The report of the Committee on Agriculture, made on the 2nd of the following May, contained a statement of the imports and exports of which I have spoken, and it requested that the Secretary of the Treasury "cause to be prepared a well-digested Manual" upon

the culture of silk. This Manual was prepared under the direction of Secretary Richard Rush, and submitted to the Speaker on the 5th of February, 1828. It comprises an illustrated volume of 220 pages.

Silk culture was now agitated everywhere. Congress took it up time and again. The Senate published a treatise on the subject in August, 1828, by De Hazzi, Counsellor of State, Germany, who had been attracted by the resolutions of the House of Representatives. State legislatures considered the culture of silk. Public meetings of all sorts took up the refrain, and it was echoed from housetop to housetop from Maine to the Gulf. The House of Representatives of Massachusetts had the question up in 1831, and it passed a resolution that "his Excellency the Governor be requested to cause to be compiled a concise Manual, to contain the best information respecting the growth of the Mulberry tree, with suitable directions for the culture of Silk,—and that this manual be distributed in suitable numbers in the city of Boston, and to every town in the Commonwealth.—That to defray the expense thus incurred, he be authorized to draw his warrant on the treasury for a sum not exceeding six hundred dollars." Jonathan H. Cobb, of Dedham, who had had considerable success in making silk, was chosen to write the manual. The book quickly went to second and third editions. In the second edition, 1833, the author makes this explanation: "Since the publication of the former edition of this little work, the Legislature of Massachusetts having further noticed it by ordering an additional number of copies to be purchased for further distribution in the different towns of this Commonwealth; and the Congress of the United States hav-

ing also resolved to purchase 2,000 copies for distribution in that honorable body; the author has thought it his duty to enlarge the present edition by giving such further information as he could obtain * * *." A fourth edition was made in 1839. Other books appeared in various parts of the country. (See pages 155 to 158.)

The wildest notions of the possibilities of this new silk culture were widespread, and took conservative men off their feet. I shall make an extract from Cobb's Manual in support of this statement; but before doing so I quote a contemporaneous account of Mr. Cobb's experiments, taken from the Boston "Mercantile Journal," to show that this author had really had a successful experience with silk-growing, and was able to speak with authority: "There is a gentleman in this vicinity, (Mr. Cobb, of Dedham,) who, for a shorter period, has perhaps been working as effectively as any other person in the way of experiment. He began the cultivation of the mulberry tree in 1826; and since that time, notwithstanding the nature of the soil, which is not the most favorable, has extended his operations so much as to be now in the habit of bringing to the Boston market American silk, manufactured, to the amount of about a hundred dollars a week, the year round." Projecting this experience at Dedham across the country at large, Mr. Cobb drew a picture which is vividly like the florid expectations of the first American silk advocates, exactly two centuries before:

"Now taking the smallest estimate of income, and in what way can a farmer, remote from a seaport town, acquire so much, with so little capital and labor, in about five weeks' time? If any person will point out

any way, and prove it, to the satisfaction of the Legislature or Agricultural Society, I think he would merit a great reward. But this business may be particularly recommended to overseers of the poor in every town, who have a farm—and every town ought to have one—to keep their paupers; for if one-half their paupers are able to gather leaves and feed the worms five weeks, this business would support all of them a year, exclusive of the cost of an overseer. Permit me to suggest one consideration more,—if all the highways in country towns were ornamented with a row of mulberry trees, on each side, half a rod apart, each mile would contain 1380 trees, the income of which, after seven years; would probably pay for repairing all the highways and the expenses of the public schools, if the inhabitants would restrain their cattle and sheep from going at large. There is another method of producing silk from mulberry trees, one year after transplanting them; which is, to plant them in rows 3 feet by 2 apart, which would give about 7000 to an acre, and every other year with a sharp instrument to cut them off within three or four inches of the ground, and feed them out or cut off every year. But whether this method will produce as much or more silk than to omit picking the leaves for seven years, I have not obtained information sufficient to decide.

"I further remark, that the education of youth is of the utmost importance to the public. May I be permitted to address the inhabitants of every school district, that they would seriously and without delay, consider the importance of connecting the silk business with summer schools, by procuring two or three acres of suitable land near each school house, and have

them well covered with mulberry trees and fenced with a mulberry hedge, with sheds near the school house, for feeding the worms and reeling the silk; and having a suitable mistress and twenty four scholars and over, to be employed in gathering leaves and feeding worms at times not interfering with regular school hours, for the term of four months, the silk worms to be hatched in succession, once in eight or ten days, and the produce of silk will be more than enough to pay the wages and board of the mistress at \$20 per month, and the board of the scholars at \$1 per week during that time. This can be proved by actual experiment and arithmetical demonstration, if we may believe the testimony of all the silk-growers and authors on the silk business.

"A shed may be erected near a school house of the following dimensions; viz., 20 feet long and 16 wide, with nine feet posts, boarded with square edged boards, the roof shingled, but no floor, two small windows, one at each end; two frames made like ladders for four tier of shelves fifteen feet long and four and a half wide, the lower ends of the ladders to be two and a half feet above the ground, and two and a half feet between them; at one end of the shed four more shelves the height of the others, thirteen feet long, one foot and eight inches wide; these twelve shelves will serve for one hundred thousand worms, and will consume about twenty five hundred pounds of leaves previous to their spinning cocoons, after each hatching, and produce two hundred and eight pounds of cocoons and make twenty six pounds of reeled silk, according to Messrs. Homergue's and Cobb's calculations; and by hatching the worms in succession for

sixteen weeks, the second hatching in fourteen days after the first, and then in ten days, and then once in eight days, until there is ten hatchings, which at that rate will make two thousand and eighty pounds of cocoons, and two hundred and sixty pounds of reeled silk, which, at the lowest price that Mr. Cobb has sold his for, \$4.50 per pound, amounts to \$1,170, or selling the cocoons at 40 cents the price at Philadelphia, they would amount to \$832; or say 25 cents, the lowest price offered anywhere, they amount to \$520. Then, allowing the mistress \$20 per month, and the board of the twenty four scholars for sixteen weeks, each at \$1 per week, it amounts to \$464, which, deducted from \$520, there remains \$56; which allowing three acres of land and the trees to cost \$600, the \$56 will pay the interest of the money and \$20 left to pay interest for two sheds which will be wanted if the silk is reeled; thus you have the children schooled and boarded without any expense to their parents or the town, and interest on the capital in the bargain. What more do you want, but faith and resolution."

The author recurs to his estimates of profits again and again. "Now, let a young man of 21 years of age, of steady habits," he advises, "purchase such an establishment, and mortgage it for security of the payment, and get it insured against fire and other casualties, and put the leaves out on shares, and work himself at some mechanical or agricultural employment, he would at the expiration of twenty years, if a temperate man, undoubtedly acquire double the property which the greater number of professional men attain to, who must have a large sum expended upon them previous to commencing business."

Just at the time when the public began to feel the excitement of the new silk industry, a new element was added to the contagion, and there arose the wildest speculation which American agriculture has ever known. This was the introduction of the *multicaulis* mulberry. Perrottet had introduced a new mulberry into France from the Philippines in 1824, the large leaves and rapid growth of which at once attracted the attention of all silk-growers. It turned out that this tree had come originally from China, and was thought to be the source of the famous Chinese silk. Perrottet called it *Morus multicaulis*, from its habit of branching or sprouting from the base. This tree reached America about 1826, and in 1830 or 1831 it was introduced into Massachusetts by William Kenrick, author of the "New American Orchardist."

The fame of the tree spread rapidly. The records of the next ten years read like fiction. Many nurserymen gave up all other business that they might grow the mulberry, and they realized several hundred per cent profit. The secret of the Chinese silk had been discovered, and every available acre from New England to the Gulf must be covered with the mulberry, and men must train their hands to the breeding of the worms and the spinning of silken threads! One nurseryman, who is still living, went to the West Indies, that he might grow hundreds of thousands of trees during the winter season, so great was the haste for plants. From the thinly settled parts of the West the planters came eager for trees at almost any price, and even in Maine the demand was great. Then came the reaction. The market was supplied and soon overstocked. A disease appeared. The winters of

New England were too severe. One man near Hartford lost nearly ten thousand trees from cold. Men lost their fortunes; and in 1839 the bubble burst. One man near Philadelphia sold 250,000 trees at one auction in the fall of that year. He realized 31 cents each, with a discount of $7\frac{1}{2}$ per cent for cash. His buyers were mostly from the West. The eastern men had grown cautious before this. Other dealers sold for much less, and many had thousands of trees left upon their hands. "The trees were sold, in some instances, for a few cents each, and thousands, if not millions, were never replanted after they had been taken out of the ground in the fall of 1839," runs a contemporary account. So *Morus multicaulis* passed from sight, and the present generation knows nothing of it. No nurseryman in the North grows it. One of the last specimens in the East was cut down about twelve years ago. It stood on the old battle ground at Germantown. Among others who went down as a result of this great collapse, was Jonathan H. Cobb, who in the meantime had assisted in the establishment of the Connecticut Silk Company, at Hartford. But his name must always stand amongst those enthusiastic and prophetic souls who contribute so much to the progress of the world.

I cannot leave this exciting topic without quoting Brockett's stirring account of this speculation, which he very properly calls "The *Morus multicaulis* mania": "One after another of the experimenters in silk culture began to advocate the *Morus multicaulis*, and recommend their friends to cultivate the trees, and raise silk if they could; but at all events to raise multicaulis trees. Grave doctors of medicine and doctors of divin-

ity, men learned in the law, agriculturists, mechanics and merchants, and women as well as men, seemed to be infected with a strange frenzy in regard to this mulberry tree. They met in solemn conclaves over bundles of *Morus multicaulis* twigs, discussing seriously the glorious time when, in the not distant future, every farm should be a nursery for the young trees, every house should have its cocooneries attached, its silk-worms of the bivoltine, trivoltine or polyvoltine breeds yielding two, three or four crops of cocoons per year. The farmers' wives and daughters, when not engaged in feeding the worms, were to reel the silk, and perhaps to spin and twist it, till silk should become as cheap as cotton, and every matron and maid rejoice in the possession of at least a dozen silk dresses. It does not clearly appear where and on what occasions they were to wear these dresses, while their whole time was to be occupied with the care of the silk-worms and cocoons.

"Gideon B. Smith, of Baltimore, is said to have owned the first multicaulis tree in the United States, which was planted in 1826; but Dr. Felix Pascalis, of New York, was the first to make known to the public the remarkably rapid growth and supposed excellent qualities of the tree; and so may be said to have opened this Pandora's box, from which so many evils escaped. The excitement in regard to the *Morus multicaulis* grew steadily; slowly, indeed, at first, but increasing with a geometrical progression until 1839, when it culminated in utter ruin to the cultivators. The shrewdest and wariest operators, men who did not believe in its loudly heralded virtues, were fairly carried off their feet by the surging tide of speculation. The

young trees or cuttings, which were sold in 1834 or 1835 for \$3 or \$5 a hundred, came soon to be worth \$25, \$50, \$100, \$200, and even \$500 a hundred. The writer well recollects being in Northampton in the spring of 1839, when Mr. Whitmarsh and Dr. Stebbins were rejoicing over the purchase of a dozen multicaulis cuttings, not more than two feet long and of the thickness of a pipe-stem, for \$25. 'They are worth \$60,' exclaimed the Doctor, in his enthusiasm. It is said that a florist and nurseryman, on Long Island, who was one of the first to introduce the tree into the country, though he had no particular faith in it, devised a plan for enhancing its price. He had sold small quantities to nurserymen in Providence and Newport, and several of the Massachusetts cities and large towns; and one day, in 1835, while at work in his nursery, he determined to make a bold push for a speculation. Hastily returning to his house and putting up a change of apparel, he mounted his sulky, drove into New York, and on board the Providence boat. Arriving at Newport, he landed, drove to the first nursery there, and asked, in an excited way, 'Have you any multicaulis trees?' 'A few,' was the reply. 'I will give you fifty cents apiece for all you have,' said the Long Islander. The nurseryman thought a moment. 'If,' he said to himself, 'Mr. ——— is willing to give that price for them, it is because he knows they are worth more.' He raised his head. 'I don't think I want to sell what few I have, Mr. ———.' 'Very well,' was the reply; 'I presume I can get them for that,' and he drove off. Every nurseryman who was known to have any trees in Newport, Providence, Worcester, Boston, or the towns adjacent, Springfield, Northampton, &c., was visited,

the same offer made, and the same answer returned. 'I came back,' said Mr. ———, 'without any trees; but you could not have bought multicaulis trees, in any of the towns I had visited, for a dollar apiece, although a week before they would have been fully satisfied to have obtained twenty-five cents apiece for them.' Yet this very man, shrewd as he was, was carried off his feet by the greatness of the demand which followed. He imported large quantities from France, multiplied his cuttings by all the devices known to his profession; and at last, so enormous were his sales, that, in the winter of 1838-9, he sent an agent to France with \$80,000 in hand, with orders to purchase one million or more trees, to be delivered in the summer and fall. Before the whole of his purchase had arrived, the crisis had come. The nurseryman had failed for so large a sum that he could never reckon up his indebtedness; and the next spring his multicaulis trees were offered in vain to the neighboring farmers at a dollar a hundred, for pea-brush.

"Another incident related of the speculation was, that after the crash came at the East, some of the largest holders of the trees, in their desire to get them off their hands, chartered a vessel notoriously unseaworthy, loaded her with the multicaulis shrubs, and sent the cargo by way of New Orleans to Indiana, insuring it in one of the marine companies at a high price. Greatly to their disappointment the vessel reached New Orleans safely, and the cargo was transhipped at an enormous expense to river boats, and when the trees reached Indiana they found no one who was willing to take them as a gift. This discreditable adventure cost the shippers a large sum of money.

"The times were rife with speculation. The great panic and disaster of 1837 had thrown to the surface many restless, unscrupulous spirits, who were willing to embark in any enterprise, however daring or doubtful its character, which seemed to promise the slightest opportunity of regaining the fortunes they had lost. Numbers of these plunged into the multicaulis speculation, and made it more disastrous in its results than it otherwise would have been; but there is this ground of consolation in regard to them, that not one of them escaped the ruin they helped to bring upon others."

I will transcribe even another account of this wild speculation, in order that the reader may see this curious chapter in our history as understood by different students. The following is extracted from a paper on "The Silk Industry in the United States from 1766 to 1874," by A. T. Lilly, contained in a bulletin of the "National Association of Wool Manufacturers," 1875. Mr. Lilly speaks of this speculation as the "multicaulis fever," and then continues: "Haste to be rich led the way. Instead of the old method of planting mulberry orchards with the well-known and hardy varieties of the tree, the system was adopted of securing from trees of a single season's growth leaves fit for feeding. For this purpose, planting in close hills or in hedges was necessary, and the *Morus multicaulis* was the favorite tree. Its luxuriant growth, when stimulated, was indeed remarkable. Its leaves, fed to the worm, produced a silk that was not equal in quality to that from the white mulberry. The trees had to be housed in winter, either in cellars or in earth-vaults. Notwithstanding the objections to it, the multicaulis grew rapidly in popular favor. Rarely

was a garden or a cultivated spot to be seen without this tree. A demand for the trees themselves sprung up,—a demand that gave them an absurd and factitious value. Prices ranged, for trees produced from one bud or cutting, and of a single season's growth, from five cents to ten, twenty, fifty cents, one dollar, and in some instances five dollars apiece. The value of trees became greater than that of the silk that could be obtained by them; the trees were worth too much to be used for silk culture, and the raising of these trees became a speculative business of great activity. The excitement reached its culminating point in 1839, when the fortunes of many thrifty men who had embarked in the enterprise were wrecked in bankruptcy. Even then, although the failure of the multi-caulis was assured, the mania for raising mulberry-trees was not abated, hardier varieties being its objects. The writer was witness to an instance of the height to which this excitement carried prices, and places the facts here as a matter of record. Two trees of one season's growth, raised by Elder Sharp, of North Windham, Conn., were sold, standing in his nursery, in August, 1842, after due advertisement, at auction. The first one offered brought \$106, the second \$100; and further sales were withheld because the bidding was not considered as sufficiently spirited. Disaster followed this baseless speculation, as might have been anticipated, when the price of the trees exceeded the worth of the product; and in 1843-44 the fabric of artificial values collapsed. A deep reaction in popular feeling took the place of the former excitement; and the whole business of silk culture sank into disfavor, along with the costly and now neglected mulberry-trees.

A blight of a general character, to which even the hardy white mulberry yielded at last, gave the finishing blow, and silk culture in America ceased to exist."

Some interest in the multicaulis mulberry and in silk-growing lingered on after the crash came in 1839, but the hard winter of 1844 wiped out the industry, and the second great epoch of silk-farming in America came to an end. This second epoch may be said to have reached from 1825 to 1844. A large special literature sprung up in these twenty years. To show something of the extent of this literature, I note below the titles of the books of this period which are in my own library at this writing:

AMERICAN SILK GROWER, THE; AND FARMER'S MANUAL. A new monthly publication, designed to extend and encourage the growth of silk throughout the United States. Edited by Ward Cheney & Brothers, Burlington, N. J. Philadelphia: Published by Charles Alexander. No. 6 (vol. i.), Dec., 1838; No. 7, Jan., 1839; No. 9, March, 1839; No. 10, April, 1839. Pp. 24 in each issue.

CLAPP, AARON. An Experiment on the *Morus multicaulis*, with Directions for Preserving Silk Worms' Eggs, and Feeding Silk Worms, and twenty receipts for making cheap dyes for coloring sewing silks. With a supplement containing extracts from various authors in relation to the profit of raising silk. Hartford: Printed by Case, Tiffany & Co. Copyr. 1839. 1839.* Illustr. Pp. 72.

CLARKE, JOHN. Treatise on the Mulberry Tree and Silkworm. And on the Production and Manufacture of Silk. Second edition. Philadelphia: Thomas, Cowperthwait & Co. Copyr. 1839. 1839. Illustr. Pp. 363.

COBB, J. H. A Manual Containing Information Respecting the Growth of the Mulberry Tree, with Suitable Directions for the Culture of Silk. In three parts. Boston: Carter, Hendee & Co. 1831. Illustr. Pp. 68.

*Date of imprint, or title-page.

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An Account of the Mulberries

There is now practically no effort to grow silk in North America upon a commercial scale. The restrictions of climate, the greater certainty of many other

crops, the opening of trade directly with China and Japan, the cheaper labor of France and Italy,—all these factors have made the business precarious and unprofitable. "This branch of industry," writes the botanist-traveler, Michaux, early in this century, "is adapted only to a populous country, where there are hands not required for the cultivation of the earth that may be employed in manufactures so as to afford their products at moderate prices. In the United States this period is still remote." Yet the persistent experiments to grow silk have been productive of good results, aside from teaching us what the limitations of our country are. A very large silk-manufacturing industry has arisen, the fabrics being made from imported raw silks. The net annual value of the finished goods of American manufacture is about seventy million dollars, and the annual imports of raw silks reach about six million pounds.

But there is another curious development of all this early experiment, the history and evolution of which had never been traced until the present writer made the attempt in an experiment station bulletin a few years ago.* This second outcome is the evolution of the mulberry itself, and this is the theme which forms the proper subject and conclusion of all this discussion of American silk-growing. Historians have followed the course of the development of the silk industry, but have neglected the subsequent course of the mulberry, upon which all the efforts at silk production have rested. The reasons for this oversight are the comparative unimportance of the mulberry for any

*Mulberries, Bull. 46, Cornell Exp. Sta. (November, 1892).

other use than the feeding of silk worms, and the botanical perplexities of the genus *Morus*, to which these trees belong.

For two or three centuries the earth has been searched for new forms of mulberry trees for the feeding of the silk worm. All the best types have been found to be forms of the white mulberry (*Morus alba*) of China, or types which are evidently direct offshoots of it. This type of mulberry trees produces fruit of inferior quality, and little effort has been made to develop fruit-bearing varieties of it. The fruit-bearing mulberry of history is another species, the black mulberry (*Morus nigra*), probably a native of Persia and adjacent regions. But there has been very little desire for the introduction of a fruit-bearing mulberry in this country, so that the black mulberry is little known here, although horticultural writers have generally referred any valuable fruit-bearing mulberry which has chanced to appear in this country to *Morus nigra*, because this is the species described in the European fruit-books. A third important factor in the evolution of American mulberries is the re-introduction in recent years of the *Morus Tatarica*, now generally known in this country as the Russian mulberry, and which is really only an outlying form of the white mulberry.

A fourth important factor is the native red or purple mulberry (*Morus rubra*, Figs. 20, 21), and to this we need to give special attention in this exploration of the evolution of our native fruits. The species is greatly variable, and it grows naturally from western New England and Long Island to Florida and Kansas and Texas. It is mentioned by very many of

the early adventurers and narrators of the colonization and colonial periods of the country, and it was often used as a food for the silk worm. It appears to have been originally found in the Massachusetts Bay region, for Francis Higginson speaks of "mulberries," amongst

Fig. 21. The wild red mulberry, as it grows in central New York.

other wild fruits, in his "New-England's Plantation," published in 1630; but it is not now indigenous to that region. William Strachey, who was in Virginia about 1610 to 1612, and wrote a "Historie of Travaile into Virginia Britannia," says that the Indians were familiar with the tree: "By their dwellings are some great mulberrye trees, and these in some parte of the country are found growing naturally in pretty groves: there was an assay made to make silke, and surely the

wormes prospered excellently well untill the master workeman fell sick, during which tyme they were eaten with ratts, and this willbe a commoditie not meanely profitable. Now yt is seriously considered of, and order taken that yt shalbe duly followed." A part of this statement, in the identical words, is found in John Smith's earlier account of the natural productions of Virginia. The tree was early spread widely in the settlements. In 1749, Peter Kalm found it planted at Montreal, where it had been brought some twenty years before, but the most northerly place at which he knew it to grow naturally was "about twenty English miles north of Albany." It was early introduced into Europe.

Although this red mulberry was early planted in cultivated grounds, no attempt appears to have been made to improve its fruit. Michaux speaks of it early in this century as follows: "The fruit * * * * might easily be augmented in size and quantity by careful cultivation: a very sensible improvement is witnessed in trees left standing in cultivated fields." William Prince, writing in his "Treatise on Horticulture," in 1828, speaks of the "Red American, a common native of our forests," as one of the "most valued" mulberries "for their fruit," but he knew no named varieties. The Congressional Manual of 1828 gives a good account of the distribution and attributes of the native red mulberry. "There are several varieties in the red mulberry tree," it says, "depending on the leaves and fruit:

- "1. Leaves all orbiculated (round).
- "2. do deeply lobed.
- "3. do with three short lobes.

"4. Fruit, berries nearly white.

"5. Fruit, berries blueish purple.

"6. do do red and long.

"7. do do blackish red."

Up to this time, no distinct domestic variety of the red mulberry had been introduced. Yet it is a significant fact that the first-named variety of mulberry originating in this country is an offspring of this wild *Morus rubra*, and not an offshoot of the many foreign types which had been introduced here. This variety is the Johnson. The first mention of it, so far as I know, is in the first edition of Downing's "Fruits and Fruit Trees," in 1845.

Four well-marked named varieties of this red mulberry have appeared in cultivation,—the Johnson, Hicks, Stubbs, and Lampasas, the first three named for persons who were instrumental in introducing them to the public. They are all chance varieties found in the woods or wild places. If the mulberry were a fruit of great importance, numbers of distinct varieties would no doubt soon be bred from this native mulberry stock. In the original edition of A. J. Downing's "Fruits and Fruit Trees," 1845, it is said that the variety known as Johnson has been "lately received from Professor Kirtland, of Cleveland, one of the most intelligent horticulturists in the country;" and it is distinctly stated that it is a form of our native species. Charles Downing reaffirms this latter statement in Purdy's "Fruit Recorder," in 1872, and in comparing the fruit with that of the wild *Morus rubra*, says that it is "of about the same quality, but of larger size." In the second revision of "Fruits and Fruit Trees," 1872, by Charles Downing, it is described as follows:

"A seedling from Ohio. Fruit very large, oblong cylindric; blackish color, subacid, and of mild, agreeable flavor. Growth of the wood strong and irregular. Leaves uncommonly large." The Johnson is very little known at the present time, and will probably soon pass from sight. Mr. Berckmans, of Georgia, writes that the "fruit is large, very good, but too little of it," and that he has "long since discarded it." "The fruit," he says "is fully two inches long by three-fourths inch in diameter, very black and of a rich, vinous flavor."

The Hicks (or Hicks' Everbearing) is a Georgian variety, as near as I can learn, although Downing, in 1872, credits it to Kentucky. It was brought to notice about 1850, or before, by Simri Rose, of Macon, Georgia, who is said to have obtained it from Thomas Elkins, of Effingham county, Georgia. Mr. Elkins "planted it in avenues, on his lanes, in his fence corners, and many other favorite places on his plantation, for his hogs, and it is said that he always had pork or bacon to sell." At the present time it is much used in parts of the South as a food for swine. Mr. Berckmans says that "the value of mulberries as an economic food for hogs is beginning to be appreciated by many farmers, who have planted large orchards of the Hicks for that purpose." It is also one of the very best varieties for poultry. It is a most profuse bearer, producing a continuous and bountiful crop for three and four months. The fruit is medium to large, very sweet, and rather insipid.

The original Stubbs mulberry tree was found growing in a wood near Dublin, Laurens county, Georgia. Col. John M. Stubbs, of that place, gave cions to Mr. Berckmans some twenty years ago, and Mr. Berckmans

introduced it to the public. It is probably the most productive of all mulberries, even exceeding the wonderful prolificacy of the Hicks. The fruit is deep black, with a very rich, subacid, vinous flavor. It is fully two inches long and over a quarter as thick in well-developed specimens.

The Lampasas variety was found in the woods in Lampasas county, Texas, by F. M. Ramsey, and was introduced in 1889 by T. V. Munson, of Denison, Texas. It has a somewhat spreading and shrub-like habit. Mr. Munson writes of it: "The Lampasas mulberry, although a native of the region only 200 miles southwest of here, is so tender here as to winter-kill. I have ceased to propagate it on that account. I have never been able to fruit it." This variety is interesting to the botanist because it belongs to the pubescent-leaved type of the mulberry, to which Rafinesque gave the name *Morus tomentosa* in his monograph of North American mulberry trees, and which Bureau, a more recent monographer, called *Morus rubra* var. *tomentosa*.

The Mexican mulberry (*Morus celtidifolia*), which reaches as far north as Texas, New Mexico and Arizona, "in the countries south of the United States is frequently planted as a fruit-tree," writes Sargent, in his great "Silva," quoting from Kunth, "although the fruit which it produces is inferior in size and flavor to that of the red and black mulberry trees." This and the common red mulberry are the only species native to the United States.

We must now enquire if the foreign types of mulberry trees, which were early introduced for the feeding of silk worms, have given any fruit-bearing

varieties of importance; for although these trees are somewhat foreign to the purpose of a book upon native fruits, we may find their evolution to be so interesting that we cannot forego the pleasure of an acquaintance-ship with them. We have already learned that the fruit-bearing mulberry of the Old World, and therefore of history, is the black (*Morus nigra*), and that our own cultivated varieties have been assumed to belong to it. As a matter of fact, however, it is very little known in America. It is not hardy, except in protected places, in New England and New York. The Black Persian mulberry of the South and of California is undoubtedly this species. This variety, with others, was inserted in the fruit catalogue of the American Pomological Society for 1875. It was dropped from the catalogue in 1883, and has not been inserted since. It is named in Wickson's "California Fruits," 1889, without particular comment. The same volume also mentions the black mulberry of Spain, as having been fruited by Felix Gillet, of Nevada City, California. This I take to be *Morus nigra*. There must be large regions in this country which are congenial to the true black mulberry, and it is strange that it is so little known. The fruit of this species is much larger than that of any other, and it possesses an agreeable subacid flavor. The fruits of the white mulberry (*Morus alba*), however, are often too sweet for most tastes when fully ripe, and in such case they should be picked before they have fully matured.

We have seen that the multicaulis mulberry quickly passed from sight after the speculative collapse of 1839 and the hard winter of 1844. Yet one record of the old contagion is left to us in the Downing mulberry

(Fig. 22). This originated at Newburgh on the Hudson, from seeds sown about 1846 by Charles Downing, one of the brothers who have become household companions to every American fruit-grower. It was noticed by the late C. M. Hovey in his "Magazine of Horticulture," in March, 1858, as "a new seedling raised by C. Downing, of Newburgh, N. Y., from the *Morus multicaulis*." The Downing often looks very different from the old multicaulis, and I have sometimes doubted if its history is correct; but there is probably no mistake as to its origin. For many years the Downing was the leading fruit-bearing mulberry, but it proved to be short-lived, and was often injured by the winters in the northern states; and even as far south as Texas it frequently suffers from the cold. In Florida and other parts of the South it is still some-

what grown, particularly as cuttings upon which to graft varieties which root less freely. Yet the nurserymen everywhere still sell the Downing mulberry; but it turns out, upon investigation, that the Downing which they sell is not the variety originated by the Downings. In fact, it is not even *Morus multicaulis*! The variety which, in good faith, they sell for Downing is really a form of *Morus alba*, the species which elsewhere in the world is grown only for the silk-worm or for ornament!

Fig. 22. Downing mulberry, nearly natural size.

With the gradual passing out of the Downing has come the gradual usurpation of the name and the good-will by a variety of the other species, and no man has recorded the transfer; and now the

true Downing is all but lost to cultivation, and the false variety is gaining in reputation. It is an excellent illustration of the operation of the struggle for existence, and the better has survived; but the wonder is that such a striking transformation could take place before our very eyes and we see it not!

The variety which, in the North, is sold as Downing, is really the New American. This variety was brought to notice about 1854, by N. H. Lindley, of Bridgeport, Connecticut. No one knows its history, but it is undoubtedly a chance seedling of one of the old silk-worm mulberries. Two other varieties, the Trowbridge and Thorburn, are almost indistinguishable from it, and of these the history is also unknown; but they are forms of *Morus alba*. The Russian mulberry type has also given us large-fruited varieties within recent years. Two of these which have received names are Ramsey White and Victoria. A Japanese mulberry, too (*Morus Japonica*), has been introduced, but it has not yet given us important fruit-bearing varieties.

It will thus be seen that our cultivated mulberry flora, although small, is yet delightfully confused; but the confusion, when once understood, is found to be the result of a curious evolution, in the course of which the old-time fruit-bearing mulberry has lost its prominence, the native mulberry has come to the fore, the epoch-making multicaulis, introduced for silk, came to be grown for its fruit, and its best fruit-producing variety has been driven out by a variety of another species which has heretofore been grown only for silk; and the entire transformation has been wrought by intelligent men who were ignorant of it!

III

THE EVOLUTION OF AMERICAN PLUMS AND CHERRIES

THE early records mention plums nearly as frequently as they speak of grapes. In fact, the abundance of many kinds of wild fruits made a great impression upon all the settlers of America, from the valley of the St. Lawrence to Georgia. The wild plum tree was seen and admired by Jacques Cartier, upon his visit to the St. Lawrence River in 1535. In the preliminary reconnoissance of the Cape Cod region, various fruit plants were encountered. Bradford and Winslow, in their journal, speak of "vines everywhere, cherry trees, plum trees, and many others which we know not." Edward Winslow writes to a friend in England in 1621, from Plymouth, of "grapes, white and red, and very sweet and strong also; strawberries, gooseberries, raspas, &c.; plums of three sorts, white black, and red, being almost as good as a damson." Francis Higginson, in his "New-Englands Plantation," 1630, mentions the following amongst the natural productions of the country: "Mulberries, Plums, Raspberries, Corrance, Chesnuts, Filberds, Walnuts, Smalnuts, Hurtleberries and Hawes of White-thorne neere as good as our Cherries in England, they grow in plentie here." Thomas Morton, in his "New English Canaan," 1632, makes the following reference: "Plum-trees, of this kind there are many; some that beare

fruit as bigg as our ordinary bullis: others there be, that doe beare fruite much bigger than peare plummes, their colour red, and their stones flat, very delitious in taste." William Wood gives a more explicit account of the wild cherries and plums, in his "New England's Prospect," published in 1634: "The Cherrie trees yeeld great store of Cherries which grow on clusters like grapes; they be much smaller than our English Cherrie, nothing neare so good if they be not fully ripe, they so furre the mouth that the tongue will cleave to the roofe, and the throate wax hoarse with swallowing those red Bullies (as I may call them) being little better in taste. English ordering may bring them to be an English cherrie, but yet they are as wilde as the Indians. The Plummes of the Countrey be better for Plumbs than the Cherries be for Cherries; they be blacke and yellow, about the bignesse of a Damson, of a reasonable good taste."

Wood's cherry is instantly recognized as the choke cherry, and it is probable that this is the species which the other writers had in mind, although it is possible that the sand cherry or even the beach plum may have attracted their attention and have been recognized as cherries. Their plum is undoubtedly the common native wild plum, which has a wide range from New England westward and southward. It is not plain, however, what the white plum of Winslow may have been. Alexander Young, in his "Chronicles of the Pilgrim Fathers," says that in the original edition of Winslow, published in London in 1622, the word "white" occurred as "with," which he calls "an error of the press;" but inasmuch as there is no white

plum, it is possible that the original printing is correct, although if "white" be omitted, there remain only two of the "three sorts" of plums,—the black and the red. If white was intended, it is probable that the writer had in mind fruits which are light-colored from the presence of a heavy "bloom." But it is evident that these running observations must not be translated too exactly. It is enough to know that the settlers found plums of eatable quality.

Captain John Smith was attracted by the wild plums when he first went to Virginia. "Plumbs there are of 3 sorts," he says. "The red and white are like our hedge plumbs: but the other, which they call *Putchamins*, grow as high as a *Palmeta*. The fruit is like a medler; it is first greene; then yellow, and red when it is ripe: if it be not ripe it will drawe a mans mouth awrie with much torment; but when it is ripe, it is as delicious as an Apricock." The reader will instantly recognize this last plum as the persimmon; and the word "putchamin" is no doubt a phonetic rendering of the Indian word from which the word persimmon is derived. Strachey, writing some four or five years later (that is, sometime from 1610 to 1612), also speaks of a "plomb which they call pessemmins," and he likens it to a medlar and an apricot, no doubt in imitation of Smith. Strachey also says: "They have cherries, much like a damoizin, but for their tast and cullour we called them cherries; and a plomb there is, somewhat fairer than a cherrie, of the same relish, then which are seldome a better eaten." I suppose that the cherry to which Strachey refers is the Chickasaw plum, which grows abundantly in that region, and which is even now

called "mountain cherry" in parts of Maryland and Virginia. John Smith's language is very similar, and it is probably the source of Strachey's information: "They have cherries, and those are much like a Damsen; but for their tastes and colour, we called them Cherries." The other plum mentioned by Strachey is probably a form of *Prunus Americana*, or possibly some large-fruited form of the Chickasaw plum.

The Native Plums in General

It is not my purpose to make an inquiry into the early records of wild plums, but merely to mention the fact that the colonists were attracted by the fruit, and that they seemed to think it worthy of improvement. This improvement did not develop, however, until the present century, and even then it was not the outcome of any direct effort at a definite object, but only the aggregate result of bringing together such wild or chance varieties as attracted the attention of lovers of fruit. It is interesting to notice, also, that these varieties originated or were discovered in parts of the country which were being newly settled. The great territory of New England, New York, Pennsylvania and Michigan has never produced a variety of native plums which has been named and attained to any prominence. This is partly due to the fact that the wild plums of this great region, while of the same species as those in the upper Mississippi valley, are less prolific of large-fruited forms than those farther west. It is chiefly due, however, to the circumstance that the European plum thrives admirably in this geographical region, and there was, there-

fore, little need of giving any attention to the inferior natives; and at the present time the fruit-growers of the East care little for and know less of these native fruits. The European plums thrive so well in these states and adjacent territory that they have become spontaneous along roadsides and in copses in many places, where they bear an annual abundance of little fruits which are commonly called damsons, and which are gathered for use in making conserves. Even as early as 1663, John Josselyn writes as follows of some of the fruits of New England: "The Quinces, Cherries, Damsons, set the Dames a work, Marmalad and preserved Damsons is to be met with in every house. It was not long before I left the Countrey that I made Cherry wine, and so may others, for there are good store of them both red and black."

In Virginia and southward, however, the European plum does not thrive so well, and the inhabitants of those regions, previous to the present generation, have not been noted for their attention to horticultural industries. The result has been that no plum industry has developed in the South until very recently. Yet the wild plums have long been gathered and employed in domestic uses, as, indeed, they have in thinly settled portions of Ontario and other parts of the northwestern territory. But it appears to have been chiefly in the newly settled regions, as I have said, that these large-fruited native plums have been sorted out and named. The settlers often suffered for lack of fruit, and were, therefore, eager to seize upon the native productions. Sometimes these plums were carried into the new country by the emigrants, and

there obtained their first notoriety. Thus, some forty or fifty years ago, a native plum was taken from Alabama to Texas, and it is now introduced from Texas under the name of Saffold. The most interesting instance of this migration and subsequent fame is that of the Miner plum; and as this appears to have been the first native plum to have received a name, it may well serve to introduce our narrative.

The seed which produced the Miner plum was planted in 1814, in Knox county, Tennessee, by William Dodd, an officer under General Jackson. Dodd appears to have had two batches of seed, one which he gathered the year previous upon Talaposa creek, and the other given him by an Indian chief. It is not clear from which lot this plum sprung. The plum gained some notice when it came into bearing, and was known as Old Hickory and General Jackson. In 1823 or 1824 Dodd moved to Illinois and settled near Springfield, taking sprouts of this plum with him. The plums soon attracted attention among Dodd's neighbors, and the variety was called in its new home William Dodd and Chickasaw Chief. The year following William Dodd's removal to Illinois, his brother moved to Galena, Illinois, and took some of the plums. About Galena the plum became known as the Hinckley. I do not know how the name Miner came to be applied to it, but Downing's reference to Mr. Miner of Pennsylvania—who probably grew and disseminated it—undoubtedly explains it. It is said by D. B. Wier that the late Hon. James G. Soulard, of Galena, introduced this plum to general cultivation. As the variety became disseminated, it received new or local names. Downing gives Hinckley, Isabel,

Gillett, Townsend and Robinson as synonyms of it. The Robinson now known is a very different fruit. The Miner is one of the best and most popular of the native plums. The fruit is large, round or roundish-oblong, dull red, skin rather thick; stone cling, short and broad, smooth or very nearly so, very short-pointed, rather sharp on the front edge; leaves large and heavy, usually inclined to be obovate, rather long-pointed, the stalks glandular. It is one of the latest ripening of all the plums of its class.

The second important event in the evolution of the native plums is the origination of the Wild Goose. On account of its productiveness, earliness, beauty, good shipping qualities, and its early introduction, this is the most popular of the native plums. It was first brought to notice by James Harvey, of Columbia, Tennessee. Some time before 1850, a man shot a wild goose near Columbia, and on the spot where the carcass was thrown this plum came up the following spring. It was introduced about 1850 by the late J. S. Downer, Fairview, Kentucky. The fruit is large, round-oblong, light red, skin thin, the flesh thin and juicy; cling, stone long and narrow, prolonged above into a sharp point and below into a narrow base, finely pitted; leaves oblong-lanceolate, peach-like, not prominently pointed, the margins finely and evenly serrate. Early, of poor quality, but because of its many striking features it is widely grown.

Another important event was the introduction of the Robinson. This is a seedling grown by a Mr. Pickett, of Putnam county, Indiana, from a seedling brought with him from North Carolina about fifty years ago, and almost every season (since large

enough) it has borne abundant crops. The variety was neglected, and never brought to the notice of the public till 1879, when Dr. J. H. Robinson (of the same township) read a paper on Chickasaw plums before the Indiana Horticultural Society, and gave a very flattering description of this plum. He had been watching it since 1872, and had had two good crops on his own trees, which bore two bushels to the tree five years after planting. It was named by the Putnam County Horticultural Society in honor of Dr. Robinson. Albertson & Hobbs, nurserymen, of Bridgeport, Indiana, introduced the variety in the fall of 1884 and spring of 1885.

Since 1860, many plums of the type of these three have come into notice in the region south of the Ohio and east of Kansas. Some of the leading varieties are Wayland, which came up in a plum thicket in the garden of Professor H. B. Wayland, Cadiz, Kentucky, and which was introduced to the public by Downer & Bro., Fairview, Kentucky, about 1876; Missouri Apricot (or Honey Drop), a plum found wild in Missouri and introduced by Stark Bros., nurserymen, of Louisiana, Missouri, in 1886; Moreman, a Kentucky plum, introduced by W. F. Heikes in 1881; Golden Beauty, found wild in Texas, and introduced by George Onderdonk in 1874; Pottawattamie, found in Tennessee, but taken west and first prominently introduced by J. B. Rice, Council Bluffs, Iowa, in 1875; Newman (Fig. 23), found in Kentucky, and introduced by W. F. Heikes.

While these events were transpiring in the South, another type of native plums was coming into prominence in the upper Mississippi valley. In this region

Fig. 23. Newman plum. Natural size. (See Fig. 28.)

the plums were large and thick-skinned, often flattened, and bearing a distinct suture or groove, the flesh firm and meaty, and the stone usually large and often very flat. The tree, too, is of a different type, being a stiff grower, with dull shoots and large, heavy, dull, more or less obovate and coarsely toothed leaves, while those in the South are slender, twiggy growers, with bright or light-colored shoots, and more slender and often peach-like, closely toothed leaves. The settlers in Wisconsin, northern Illinois, Minnesota and Iowa found this type of plum abundant in the timber belts. Very often trees were found bearing fruit of unusual size and excellence. Such trees were removed to gardens, or seeds of them were sown, and very soon a new race of plums had come into cultivation.

The Wolf was one of the first of these varieties to be named. This originated on the farm of D. B. Wolf, Wapello county, Iowa, about forty years ago, from pits said to have been gathered from wild trees.

The Rollingstone is one of the prominent varieties of this type. It was found nearly forty years ago on the bank of the Rollingstone Creek, Winona county, Minnesota, by O. M. Lord, and he introduced it to public notice about fifteen years ago. The fruit of the Rollingstone is very large (often $1\frac{1}{2}$ inches each in diameter), round, flattened and truncate at the ends, mottled and spotted pink-purple, skin very thick; flesh firm, sweet and excellent; semi-cling, stone nearly circular, rather flat, sharp on the back edge, nearly smooth; leaves large and firm.

The Quaker was found wild by Joseph Bundy, of Springville, Linn county, Iowa. It was disseminated

about 1862 by H. C. Raymond, Council Bluffs, and by him named Quaker, in compliment to Mr. Bundy, who is a Quaker. It is a very large purple-red plum, with very firm and sweet flesh.

De Soto is one of the most popular plums in the Northwest. It was found wild on the Mississippi

Fig. 24 Forest Garden plum. Natural size.

at De Soto, Wisconsin, and generally introduced by Elisha Hale, Lansing, Iowa, in 1863 or 1864.

Forest Garden (Fig. 24), another excellent kind, was taken from the woods at Cedar Rapids, Iowa, by Thomas Hare, and introduced by H. C. Raymond, of the Forest Garden Nurseries, Council Bluffs, about 1862.

Cheney was found in Mormon Ravine, a few miles

below La Crosse, Wisconsin, some years ago, and introduced by E. Markley, of La Crosse.

The Weaver, a leading native plum, was found wild near Palo, Iowa, by Mr. Weaver; introduced by Ennis & Patten in 1875. O. M. Lord tells me that plums indistinguishable from the Weaver are wild in profusion on the St. Peter or Minnesota River.

In this way, about a hundred choice forms of the native plum of the Northwest have been gathered and sorted and given names; and they are so much more hardy and reliable in that region than the European type of plum that they will probably form the chief foundation from which the future orchard plums of the northern prairie states will spring. They are already grown to an important commercial extent.

The Americana Group of Plums

It will be necessary, before proceeding further with the historical data, to discuss the natural species from which the plums that we have mentioned have come. The layman may not know that the genus *Prunus*, to which the plums and cherries belong, is one of the hard knots to botanists. That is, the plants are widely variable, and there are few pronounced or constant marks to distinguish one type of variation from another. The numerous forms grade into each other so imperceptibly and inextricably that the genus cannot be readily broken up into species. But these genera which are the despair of the systematic botanist are the inspiration of the evolutionist. In them the philosopher thinks that he can trace the influences of soil and climate and the

other environments which cause plants to assume new forms. If, therefore, we cannot delimit the species of *Prunus* to our satisfaction, we shall, nevertheless, find them to be a most suggestive study when we attempt to trace the evolution of our native fruits.

The wild plum of the North is known to botanists as *Prunus Americana* (Fig. 25). It was first described by Humphrey Marshall in his "Arbustrum Americanum," in 1785. Marshall's complete account is as follows :

"*Prunus Americana*. Large Yellow Sweet Plumb. This generally rises to the height of 12 or 15 feet, spreading into many stiff branches. The leaves are oblong, oval, acute pointed, sharply sawed on their edges and much veined. The flowers generally come out very thick round the branches, often upon thick short spurs; and are succeeded by large oval fruit with a sweet succulent pulp. We have a great variety of these, growing naturally in a good moist soil, with reddish and yellowish fruit, but differing much in size, taste and consistence."

The species has a wide range. It grows in thickets and woods from Newfoundland to Colorado, Florida and Texas, and northern Mexico. It is commonly a small low-headed tree, or sometimes only a large bush, making a thick and usually thorny top. It bears a firm, meaty, usually compressed, dull-colored late fruit, with thick and usually very tough, glaucous skin, and large more or less flattened stone, which is often nearly or quite free; and the leaves are large obovate, thick, veiny, jagged and dull. The fruits of wild forms of *Prunus Americana* vary widely in season, size, shape, flavor, and character of stone. Trees



Fig. 25. *Prunus Americana*. Half size.

in the same clump often vary two weeks in season of ripening of fruit, which may vary from dull, deep red to yellow, and from the size of a small cherry to that of a common garden plum. It should be said, however, that there is no true clear yellow fruit in this species. The yellow of *P. Americana* is always a more or less ill-defined under-color, over which are laid blotches of red. The fruits are commonly marked with a distinct suture. All the varieties have a light purple bloom. The Texan form of *Prunus Americana*, known locally as the Hog plum, appears to differ somewhat from the northern forms, but there seems to be no reason to regard it as a distinct species. The *Prunus Texana* of Scheele is *Prunus Americana*, as shown by an authentic specimen in the Engelmann herbarium at St. Louis. The Texan type is not in general cultivation, however, and need not be further discussed here. It is in the northern prairie states, as I have said, that this species reaches its greatest excellence in fruit-bearing. All the horticultural varieties of merit, so far as I know, have originated in northern Illinois, Wisconsin, Minnesota, Iowa, South Dakota, Nebraska and Kansas, with one or two unimportant exceptions in Texas.

Some botanists suppose that this northern plum really comprises more than one natural species. Professor Sargent is of the opinion that the *Prunus nigra* of Aiton should be revived to designate those forms which are characterized by very flat and smooth stones, very broad leaves, glandular leaf-stalks and calyx lobes, and large flowers; and he inserts a plate and description of what he conceives to be this species in his noble "Silva of North America." My

friend, Professor Charles A. Davis, of Michigan, finds two forms, which he distinguishes as follows: "The large-flowered form is the more common, and blooms about a week or even ten days before the other, and usually before the leaves begin to appear. The small-flowered form I have never found until this spring, when I came upon a clump of it in full bloom, and at once became interested in it because of its decided differences from the other and common form. The trees were larger, more spreading, and with a much rougher bark than the large-flowered form; and a number of the trees bore flowers with a decidedly yellowish tint, which was very noticeable from a short distance. The fruit was late, maturing the middle of September, and was reddish, almost purple in very ripe specimens, with a whitish bloom, small and rather palatable."

Aiton described his *Prunus nigra* in "Hortus Kewensis," in 1789, from a tree growing in England. He did not know Marshall's previous description. In 1808, John Sims figured what he supposed to be the same plant in the "Botanical Magazine." There is little in either of these descriptions which can be construed as delimiting the plant from Marshall's *Prunus Americana*. Perhaps the only designative characters are the "petiolis glandulosus," and the "glandular-toothed" calyx segments.* Six years ago, in my bul-

*Aiton described *Prunus nigra* as follows (Hort. Kew. ii. 165, 1789):—

14. *P. umbellis sessilibus solitariis paucifloris, foliis deciduis ovatis acuminatis, petiolis biglandulosus.*

Black Cherry Tree.

Nat. of Canada.

Introd. 1773, by Messrs. Kennedy and Lee.

Fl. April and May.

I have seen Aiton's specimen in the Natural History Museum, at South Kensington. It comprises a spray of foliage and a flowering branch. It is apparently the same plant which contemporaneous botanists are calling *Prunus nigra*.

letin upon "The Cultivated Native Plums and Cherries," I was unable to find any warrant for accepting two species of these northern plums, although I had made a studious effort to do so for several years. In the meantime I have studied the plants diligently in the wild and under cultivation, and have now gone over much herbarium material anew, but I have been utterly unable to find characters upon which to make two species. The glandular character of the calyxlobes may be present or absent in the same horticultural variety when grown in different places, and it is not associated with large or early flowers, with biglandular leaf-stalks or with large and flat stones in the fruit. The presence or absence of two glands upon the leaf-stalk is of no classificatory importance. The glands are frequently present and absent on contiguous leaves on the same tree. In the shape of the stones there is the most insensible gradation from the small turgid stone, which is assumed to be designative of *Prunus Americana*, to the great flat stone of *Prunus nigra*. The accompanying illustration (Fig. 26) shows this admirably. Nos. 10, 11, 12, 13, 14 are stones of named varieties which Professor Sargent considers to belong to *Prunus nigra*. All the others are forms of typical *Prunus Americana*. One of the flattest stones in the lot is No. 2, which came from a tree in central New York which has most pronounced characters of the extreme and typical Americana form. The inventory of these stones is as follows:

No. 1, *Prunus Americana* from Colorado; 2, same from central New York (stone flat, from a small very early, red fruit); 3, same from Wisconsin (stone very turgid); 4, same from central Michigan (small-flow-

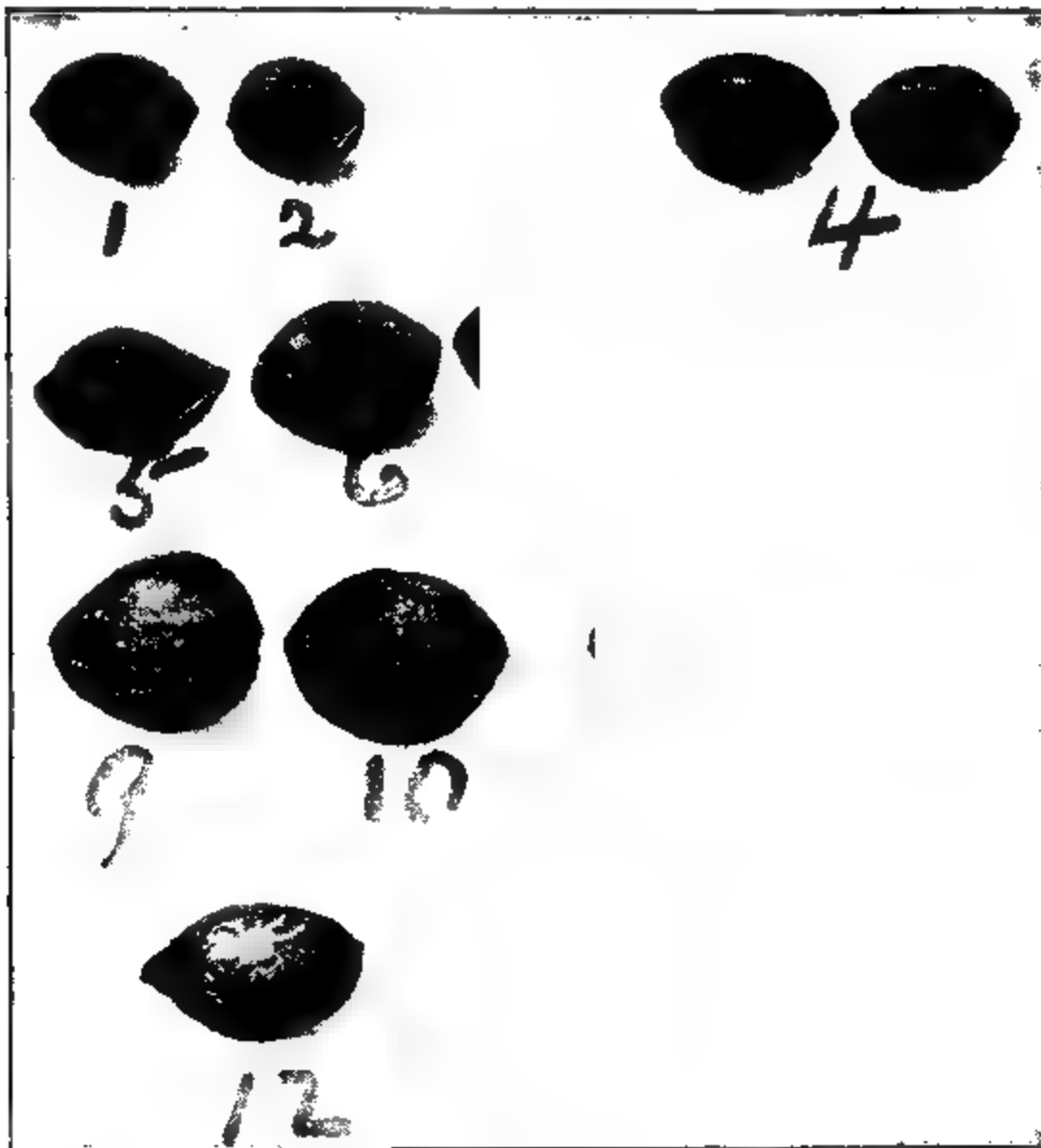


Fig. 20. Stones of *Prunus Americana*. Natural size.

ered, typical Americana form, but stone as flat and as strongly edged as in the nigra form); 5, Deep Creek, grown in Maryland; 6, Louisa, grown in Maryland; 7, De Soto, grown in Maryland; 8, De Soto, grown in Iowa; 9, Forest Garden, grown in New York; 10, Purple Yosemite (*Prunus nigra*), grown in Maryland; 11, Quaker (*P. nigra*), grown

in Maryland; 12, Weaver (*P. nigra*), grown in Maryland; 13, Weaver, grown in Minnesota; 14, Weaver, grown in Texas.

To give the reader an opportunity to compare this interesting variation in plum stones with like variation in another and foreign species, I insert a picture (Fig. 27) of stones of the myrobalan plum (*Prunus cerasifera*) selected from an imported commercial sample. (See discussion beginning on page 208.)

The early flowering of some trees of this *Prunus Americana* stock is a most conspicuous character, but I do not see that it should excite any more interest than the very early maturing of fruit on some trees; nor do I see that an occasional large-flowered form is any more worthy of being accorded specific rank than a large-fruited form. These are all probably individual variations, and likely have no close relation to the genetic history of the species.

I am obliged, therefore, to unite *Prunus nigra* with *P. Americana*. This I regret the more because it is undoubtedly true that there are two or more well marked wild varieties passing as *P. Americana*, and growing together in the East. One type is a twiggy, virgate grower, with large and mostly earlier flowers; another is a stout and stiff grower, with small flowers. So far as I have been able to determine, the fruits and stones of these two forms, save possibly in time of ripening, are not characteristically distinct. These forms are certainly common in central New York and in Michigan. It is a question, however, if the habit of growth is not largely determined by the soil, position, or other circumstances in which the trees grow. At all events, these differences are not more marked

than similar varieties in elms, mulberries or hawthorns, and which no one associates with specific differences. I am not yet prepared to affirm that the wild plum of the North contains but a single species, but I am convinced that no botanist has yet been able to draw designative characters to separate out a second or third species.

The extreme forms of this Americana plum are so well marked, however, that it will be useful, for purposes of study, if incidental names be given them. I am, therefore, inclined to follow Waugh* in calling this northern type *Prunus Americana* var. *nigra*.

It should be said that beyond the Mississippi there is a very pubescent-leaved form of *Prunus Americana*, which is known to botanists as the variety *mollis*.† It is from this type that the Wolf plum comes. There is also a form of this with flowers as completely double as those of St. Peter's Wreath, or

*F. A. Waugh, Bull. 53, Vt. Exp. Sta. 58 (Aug. 1896):—

P. AMERICANA, Marsh. COMMON WILD PLUM. The type distinguished by entire calyx lobes, which are pubescent on the inner surface; stone turgid; leaves oval or slightly obovate; petioles mostly without glands. Tree spreading, ragged, thorny, 8-20 ft. high; flowers large, white, on slender pedicels; leaves very coarsely veined, never glossy or shining; fruit more or less flattened upon the sides, firm and meaty, the skin tough and glaucous and never glossy, ripening through yellow to red. Occurs wild from New Jersey and New York, to Montana and Colorado. It varies southward, in Texas and New Mexico represented mostly by the variety *mollis*.

VAR. NIGRA. CANADA PLUM, RED PLUM (*P. nigra*, Ait; *P. Americana*, T. & G.; and 6th ed. Gray's Manual). In its extreme forms easily distinguished by the glandular-serrate calyx lobes, glabrous on the inner surface; compressed stone; broadly oblong-ovate to obovate leaves with petioles bearing two glands. Flowers large, white, with short, thick peduncles conspicuously marked by the scars left by the falling of the bud scales; pedicels dark red, slender, glabrous; calyx tube broadly obconic, dark red on the outer and bright red on the inner surface; fruit oblong-oval, orange-red; stone nearly oval, compressed. Occurs wild from Newfoundland west to Rainy and Assiniboine rivers in Canada, and commonly in the New England states, where it is found along roadsides and in waste places.

†This is *Prunus australis* of Munson. See Waugh, Bot. Gaz. xxvi., 50.

similar spireas. The named varieties of native plums which, it seems to me, can be confidently referred to *Prunus Americana* are named below. There are others which belong to this species, but I have not had an opportunity of critically examining them:

American Eagle, Beaty's Choice, Cheney, Chipeway, Cottrell, Deep Creek, De Soto, Forest Garden, Gaylord, Harrison's Peach, Hawkeye, Illinois Iron-

Fig. 27. Variation in stones of Myrobalan plum. Natural size.

clad, Itaska, Jessie, Kickapoo, Late Rollingstone, Le Due, Little Seedling (of Chas. Luedloff), Louisa, Luedloff's Green, Luedloff's Red, Maquoketa, Minnetonka, Mussey, Newton Egg, Ocheeda, Peffer's Premium, Purple Yosemite, Quaker, Rollingstone, Smith's Red, Speer, Stoddart, Wazata, Weaver, Wier's Large Red, Wyant, Yellow Sweet. Of the variety *mollis*, of *Prunus Americana*, two named fruit varieties are well marked, the Wolf (or Wolf Free), and the Van Buren.

The Chickasaw Group

It now remains to discuss the botanical status of the southern type of plums, of which the Newman, Pottawattamie, Wild Goose, Miner and Wayland are examples. We shall find that greater uncertainty and confusion attach to these fruits than to their congeners of the North. These southern fruits are generally known as the Chickasaw plums. If we examine them critically, however, we shall find that they fall somewhat readily into two groups. One of these groups we shall call the true Chickasaws (Fig. 28). This group differs from other plums by a more slender, spreading and zigzag growth, usually smaller size of tree, red twigs, by smaller, lanceolate or oblong-lanceolate, very closely serrate, shining leaves, which are conduplicate or trough-like in habit, by early small flowers which, upon old wood, are densely clustered on the spurs, and by an early red (rarely yellow) and more or less spotted translucent fruit, the flesh of which is soft, juicy, and more or less stringy, and very tightly adherent to the small, broad, roughish stone.

This species, like *Prunus Americana*, was founded by Humphrey Marshall in 1785. His full description is as follows: "*Prunus angustifolia*. Chickasaw Plumb. This is scarcely of so large a growth as the former [*P. Americana*], but rising with a stiff, shrubby stalk, dividing into many branches, which are garnished with smooth lance-shaped leaves, much smaller and narrower than the first kind [*P. Americana*], a little waved on their edges, marked with very fine, slight, coloured serratures, and of an equal,

Fig. 22. Newman, one of the Chickasaw plums. (See Fig. 22.)

shining green colour, on both sides. The blossoms generally come out very thick, and are succeeded by oval, or often somewhat egg-shaped fruit, with a very thin skin, and soft, sweet pulp. There are varieties of this with yellow and crimson coloured fruit. These being natives of the Southern states, are somewhat impatient of much cold." It was later described by Michaux as *Prunus Chicasa*.* It is also undoubtedly the plant intended by Rafinesque, when he described *Prunus stenophyllus* in his "Florula Ludoviciana," in 1817. In a wild state the little trees or bushes are thorny, and the thorns persist in some of the cultivated varieties. It grows wild, often in dense thickets, from southern Delaware to Florida, and westward to Kansas and Texas. It is commonly stated in the books that the Chickasaw plum is not native to the Atlantic states, and some suppose that it was introduced into the United States from countries to the south of us. I have been unable to find sufficient reasons for these opinions, and I believe that the species is native to the Southeastern states. In Maryland, as I have seen it, it behaves like an indigenous plant, and the people regard it as a true native. The small, acerb fruit of the thorny and scraggly wild bushes is known in Maryland as "mountain cherry."

One of the first persons to call attention to the horticultural possibilities of the Chickasaw plum

*The specimens in Michaux's herbarium, at Paris, are *Prunus hortulana*, not the plant we have taken to be *P. angustifolia*; but they are marked with an interrogation point, and they may not be the plant which he meant to designate.

His *Prunus hyemalis* is *P. Americana*; his *P. sphærocarpa* is *P. maritima*. Of his *Cerasus borealis* there are two things on the sheet, but they are both forms of *P. hortulana*.

was William N. White, of Athens, Georgia. In the "Horticulturist" for 1852, he describes the tree and fruit,—the latter "either bright red or yellow"—and speaks of one variety which ripens nearly a month later than the ordinary forms, the fruit being "nearly free from astringency" and "about the size of Prince's Yellow Gage." In the original edition of his "Gardening for the South," 1856, Mr. White also mentions the Chickasaw plum, and adds: "Doubtless many excellent native varieties will be originated from this hardy native fruit. Some are now found almost entirely free from astringency. This plum seems free from curculio, and never fails of a crop."

The varieties which seem to be the most unmistakably true Chickasaws, among those which I have studied, are the following:

African, Arkansas Lombard, Caddo Chief, Coletta, Early Red, El Paso, Hoffman, Jennie Lucas, Lone Star, Newman (Figs. 23, 28), Ogeechee, Pottawattamie, Robinson, Schley's Large Red, Transparent or Yellow Transparent.

The Hortulana Group

The second group of these southern plums is probably the most important type of native plums now in cultivation. It includes varieties characterized by strong, wide-spreading growth, and mostly smooth twigs; a firm, juicy, bright-colored, thin-skinned fruit, which is never flattened; a clinging, turgid, comparatively small, rough stone, which is sometimes prolonged at the ends, but is never conspicuously wing-margined, and by comparatively thin

and firm, shining, smooth, flat, more or less peach-like, ovate-lanceolate or ovate, long-pointed leaves, which are mostly closely and obtusely glandular-serate, and the stalks of which are usually glandular. In the wild state, it appears to follow the Mississippi river from northern Illinois to Arkansas, in its middle region ranging as far east as eastern Kentucky and Tennessee, and possibly to Maryland, and in the southwest spreading over Texas. It is probable that the large red plums of which Humphrey Marshall had heard, over a century ago, as growing upon the Mississippi, and which he called *Prunus Mississippi*, were of this hortulana group. Marshall's complete description of this plum is as follows: "*Prunus Mississippi*. Crimson Plumb. This grows naturally upon the Mississippi, and is of larger size than most of the other kinds. The fruit are crimson coloured, and somewhat acid." (*Arbustrum Americanum*, 112.)

To this group belong the Wild Goose, Miner, and Wayland, and their kin. It had not been recognized and delimited by botanists as distinct from other tribes of plums, and six years ago, when attempting a monograph of the cultivated native plums, I proposed the species *Prunus hortulana* to designate the group. The name *hortulana* was chosen to record the fact that these interesting plums were first studied by horticulturists rather than by botanists. The varieties are intermediate between the Americana and Chickasaw groups. The fruits lack entirely the dull-colored, compressed, thick-skinned and meaty characters of the Americanas, and approach very closely to the Chickasaws.

They are usually covered with a thin bloom, and are more or less marked by small spots. They are variable in period of ripening, there being a difference of no less than two months between the seasons of some of the cultivated varieties. In color they range from the most vivid crimson to pure golden yellow.

In the seven years which have now elapsed since I made my first serious study of the botanical features of these fruits, I have had trees and botanical specimens of the native plums constantly before me in great variety, and certain novel conclusions respecting the botanical status of this hortulana class have been forced upon me. If one attempts to make an analytical study of this *Prunus hortulana*, he is first of all impressed with the singular fact that, whereas cultivated varieties of it are numerous, it is rare in a wild state, and is almost unknown to field botanists. It turns up now and then in the Mississippi valley region and in Texas, but the stations of the feral plants are widely scattered and local. Associated with this comparative rarity of the wild plant is the fact that the species has no distinctive range. It grows where both the Chickasaw and Americana types grow, but it appears not to occur where either of those species alone grows. Well-marked species of plants nearly always have an individual geographical range, but the distribution of *Prunus hortulana* seems to be accidental. The next remarkable feature which strikes the critical student is that, although there are certain types of it which seem to have well-marked specific characters, it grades off imperceptibly to the Chickasaw group on one hand and to the Americana

The image area is mostly blank, suggesting the figure itself is not visible or is a very faint illustration. The caption 'Fig. 29. Kanawha plum.' is centered below the main text block.

Fig. 29. Kanawha plum.

group on the other. So true is this, that I cannot give a single technical character which seems to be invariably associated with the species. A fourth noticeable feature is the tendency to emphatic departures from the assumed type of the species, especially in the direction of large-leaved forms, as in the Kanawha (Fig. 29). The reader has already guessed my conclusion: *Prunus hortulana* is a name

for a brood of natural hybrids between *Prunus angustifolia* and *Prunus Americana*.*

I am aware that it is a dangerous expedient to invoke hybridity to account for inexplicable behaviors of plants. It is likely to serve only as a cloak for superficial knowledge, but it is convenient, nevertheless, and in the present instance there is no other resort to cover the writer's ignorance of the subject. But there is really much explicit foundation for the belief in this hybridity, as I have already explained; and it is known that many of these native plums can be freely hybridized. I am the more convinced of the validity of this position from the similar behavior of certain wild apples, the vagaries of which are explained in the next chapter. Some of the plums which I have referred to *Prunus hortulana* may be direct developments from the true Chickasaw type, and others may be direct offshoots or variations from the *Americana* type. In my monograph upon "The Cultivated Native Plums and Cherries" (Bull. 38, Cornell Exp. Sta.), I made a sub-group of this *hortulana* class to comprise "a few anomalous varieties which appear to be intermediate between *Prunus hortulana* and *P. Americana*. They may be an offshoot of *P. hortulana*, or it is possible that they constitute a distinct species. The Miner is particularly well marked, but there are others which it is somewhat difficult to separate from *P. hortulana*. The group differs from the species by the dull and comparatively thick leaves, which are

*This disposition was first made in Bot. Gaz. 1896, p. 462, but it was suggested two years earlier (see "Survival of the Unlike," 424). See, also, Bull. 131, Cornell Exp. Sta. 170 (1897).

conspicuously veiny below, and irregularly coarsely toothed, and more or less obovate in outline, by a late, very firm fruit, and by a more or less smooth and Americana-like stone. I am not able to designate the range of the wild plant, but it appears to occur in Illinois (and perhaps Indiana), Missouri, Tennessee, and perhaps in Arkansas." This sub-group I called *Prunus hortulana* var. *Mineri*. The varieties Miner and Forest Rose are typical of it. These are so near *Prunus Americana* that Sargent refers them to that species. In foliage and fruit they have marks of the hortulana tribe, and I now regard them as hybrids—perhaps secondary ones—which partake very strongly of the Americana blood.

One who diligently studies the native plums will be impressed with the great variation which is associated with change of climate or locality. In the southern states, the flowers tend to appear wholly in advance of the leaves, and they are borne upon short stalks, or may be nearly or quite sessile. In the North, the flowers and leaves are generally coetaneous, and the flower stalks are usually longer. This curious phenomenon, which is illustrated in the accompanying engravings (Figs. 30, 31), is due to the more sudden outburst of spring in the North, by virtue of which all the latent energies of the plant are pushed into simultaneous expansion*. The same sudden outburst is seen in *Prunus Americana* (Fig. 32). This difference is often so pronounced in botanical specimens of flowering shoots of the same horticultural variety, taken in the South and the North, that even good botanists may be confounded

*See, also, "Survival of the Unlike," Essay XVII.



Fig. 30. Newman, grown in New York.



Fig. 31. Newman, grown in Maryland.



by it. But the differences in climate are not recorded in the flowering and the leafing alone, but often also in the form and texture of the leaves and in the character of the fruit. The New York plum, as I have seen it in Maryland, I should hesitatingly refer to *Prunus folia*, but as it grows in New York, I am in doubt whether to refer it to that species or to *Prunus hortulana*. These considerations incline me the more to discard my *Prunus* as an original species and use it in the future to designate a well-marked race of cultivated origin of which is true in contemporary environments and in the natural mixing of two parent stocks; and thereby the name *hortulana*—"belonging to a garden"—becomes even more significant than I intended. I do not propose this as my final conclusion, but it states the case as I see it at this writing. To my mind, this view of the origin of these valuable *hortulana* plums is most satisfactory and inspiring, for it is a working

fig. 32.
grown in
Maryland.

and elastic hypothesis which explains and co-ordinates the rapid events of contemporary evolution.

An interesting peculiarity of the Wild Goose plum is the facility with which it appears to hybridize with the peach. The most famous instance of such apparent hybridization is that of the so-called Blackman plum. About thirty years ago, Mrs. Charity Clark procured from an orchard in Rutherford county, Tennessee, which contained Wild Goose and Washington plums, seeds of plums, and gave them to Dr. Blackman, of Nashville. One tree among the resulting seedlings bore good fruit, which was called the Blackman, and was disseminated by a local nurseryman. A competing nursery, in endeavoring to procure cions from this tree, inadvertently cut them from an adjacent tree—itsself one of the batch of seedlings—and sold the trees which it grew as Blackman. Now, this second tree makes fruit-buds in abundance, but they never open; and from the resemblance of the leaves to those of the peach, the plant is generally thought to be a hybrid between the Wild Goose and the peach. Curiously enough, the genuine Blackman has never been widely disseminated, but the spurious and worthless substitute has been sold in large quantities. In order to avoid confusion, the original Blackman has been rechristened Charity Clark. There are, therefore, two Blackman plums, one of which is practically unknown to cultivation, but which has been renamed, and the other is barren and will soon pass from sight.

The only authentic hybrid which has come from the union of the Wild Goose and the peach has been produced by J. W. Kerr, of Maryland. Mr. Kerr's tree,

as I recall it, is large, spreading and peach-like. The leaves are long and peach-like, although rather broad and short-pointed, but the flower-buds, although they form in profusion, never open, so that the tree is barren. This is a hybrid between the Wild Goose and Troth's Early peach. Twenty-five flowers of Wild Goose were emasculated in the bud and covered with paper sacks. When in full bloom, peach pollen was applied, but the flowers were not again covered. Twenty-one of the flowers set fruit, and twenty-one trees were obtained from the seeds. Twenty of the trees were indistinguishable from peach, but the remaining one, as indicated above, gives every evidence of being an intermediate.

The varieties that I have studied which fall into *Prunus hortulana* are as follows:

Clara, Clark, Cumberland, Garfield, Golden Beauty, Indian Chief, Kanawha, Missouri Apricot (Honey Drop), Moreman, Mrs. Clifford, Pool's Pride, Reed, Roulette, Saffold, Sophie, Sucker State, Texas Belle, Wayland, Whitaker, Wild Goose, Wooten, World Beater.

To the Miner sub-group I should refer the following varieties:

Clinton, Forest Rose, Idol, Indiana Red, Iris, Langsdon, Leptune, Miner, Prairie Flower, Rachel.

Since the above account of the hortulana plums was written, Waugh has given the group independent study, and writes of it as follows:*

When, in 1892, Professor Bailey proposed the species *Prunus hortulana* to include the Wild Goose plum and its nearest relatives, it was at first a relief and afterward a puzzle to horticult-

*"The New View of the Hortulana Plums," Garden and Forest, Sept. 1, 1897.

turists. It was a relief to have these anomalous forms separated from *Prunus Americana* and from *P. angustifolia*, where they had previously caused confusion ; and it was gratifying to have them separately characterized, even though it was very difficult to make the specific description fit all the varieties. But to maintain a description for the species which would fit all the varieties has been an ever-growing puzzle. And thus a second time Professor Bailey has brought us relief by his decision that this is "a mongrel type of plums, * * * no doubt hybrids" of *Prunus Americana* and *P. angustifolia*.

This new view of the hortulana plums seems likely to find much readier currency among pomologists than did the distinct species view. Indeed, some reputable horticulturists have never accepted the separate species notion ; and no two anywhere or at any time have fully agreed upon the varieties which were to be referred to the species.

These cultivated varieties present an inextricable confusion of closely graded differences of character passing without a break from *Prunus Americana*, through the Miner group (Bailey's *P. hortulana* var. *Mineri*), then through the Wild Goose group, and by way of such varieties as Schley, Clifford and Macedonia into the true Chickasaws. There is absolutely no line of demarcation, however dim, among these varieties. Such a series of forms cannot be conveniently doled out into species, even when we take the most advanced evolutionary view of what constitutes a species. But as soon as the Wild Goose group is understood to be a company of hybrids, the matter becomes comparatively clear. We can easily believe that there have been numerous independent hybrid origins followed by still more numerous secondary, tertiary and quaternary crosses, and these would account fully for the extraordinary variability and wide diversity of characters among these plums. The varieties of the Miner group may reasonably be supposed to be secondary hybrids between Wild Goose types and *Prunus Americana*; or they may be, in some instances, primary hybrids in which the Americana influence has preponderated. Such varieties as Ohio Prolific, Schley, Texas Belle and Wooten may be supposed, on the other hand, to be secondary hybrids between Wild Goose and the Chickasaws.

All this will drive every plum student, pomologist or botanist

to a conclusion which we ought to have reached independently before; namely, that no full classification of our cultivated varieties can be made which shall be satisfactory to everybody. It is a matter of unquestionable convenience to divide our multiform varieties into several groups, but the lines between these groups are purely imaginary and arbitrary, and certain varieties which come near the division line somewhere may be put into one group by one man and into the other group by another, and both men be right. It is all a matter of judgment, and a very delicate matter, too. There has already been too much controversy over some of these doubtful varieties. What plum students need now is less controversy and more patience.

The cultivated hortulana plums may be best understood by arranging them in four groups. Three of these have been mentioned—the Miner group, the Wild Goose group, and the Schley or Clifford group. These form an unbroken series from *Prunus Americana* to *P. angustifolia*. There is a fourth group at present classified with the hortulanas, but comparatively distinct from the others. This group is made up of such varieties as Wayland, Moreman, Golden Beauty, Reed, Leptune, Kanawha and others.

Waugh makes a further contribution to the subject in the following sketch of "The Wayland group of plums:"*

In an article in last week's issue [quoted above] I called attention to the continuity of the series of intergradients between the Americana and the Chickasaw plums, and said that the series might be roughly marked by three types, the Miner, the Wild Goose, and the Schley or Clifford. It was also noted that another group, standing somewhat aside from this series, might, for the present at least, be regarded as belonging among the hortulana plums, and that this group is comparatively distinct, and very interesting. This I have designated as the Wayland group† from one of its best types, the Wayland plum. Golden Beauty is also a good type of this group, and is well known in the southern states, though not

*Garden and Forest, September 8, 1897.

†Vermont Experiment Station, 10th Report, p. 103.

northward. Moreman is the commonest variety of the group in the northern states, but is not well known in the South, and is not quite so good an exponent of the characters which mark this group. After considerable deliberation, I think that Wayland is the best and most convenient group name for these varieties.

Of course, this group is not free from puzzling forms which show equivocal characters, apparently borrowed from the Chickasaws, Americanas, and other groups; but on the whole, it is much better marked than the Miner or Wild Goose sections, which have for several years been thought worthy of recognition. The varieties are characterized by straight, slender, dark-colored twigs; very large, luxuriant foliage, broad leaves, which are often pubescent on the larger veins beneath, and which have from two to six glands on the petioles; axillary buds often triple; blossoms and fruit very late, mostly after Miner; fruit spherical, or nearly so, red or yellow, with many small dots, thin-skinned and of fine quality.

Several varieties of this group are already widely distributed in cultivation. Others of considerable promise have been recently introduced. Those which I have had the opportunity to examine, and which seem to belong with Wayland, rather than in any other group, are Columbia, Crimson Beauty, Cumberland, Garfield, Golden Beauty, Kanawha, Leptune, Missouri Apricot, Moreman, Nimon, Reed, Sucker State, Wayland and Worldbeater. Mr. T. V. Munson, in correspondence, mentions another variety, Erby's September, growing in his grounds, which apparently belongs with those named here.

Of these varieties, Cumberland, Golden Beauty, Kanawha, Leptune, Reed and Wayland best show the distinctive foliage and tree characters which separate them from adjoining types. These are all good plums from the planter's standpoint. All of them are very ornamental. Reed is one of the most beautiful trees of its size I ever saw.

These varieties have usually been put in the Wild Goose class, though Bailey, who has done most of the work in the classification of native plums, puts Leptune, one of the best marked varieties, into the Miner group, and President Berckmans, who introduced Kanawha, says "this is beyond question

a form of *Prunus Americana*." The whole group has also been roughly referred to *P. glandulosa*, Torr. & Gray, but this is evidently a mistake. Mr. T. V. Munson has given this question serious study, and has concluded that all these varieties are derived from *P. rivularis*, Scheele. This is a somewhat startling decision, and extremely important if true. The facts are, however, first, that we are yet too poorly acquainted with this species to make critical comparisons; secondly, that Scheele's description, made at second hand from Lindheimer's specimens, is not sufficiently precise to preclude mistakes; thirdly, that the description,* what there is of it, fails, in important particulars, to fit the varieties in question; and fourthly, that many of these varieties have originated in localities where it is almost impossible to believe that *P. rivularis* could be growing. (See pages 223, 224.)

To particularize further, the National Herbarium† contains only the following specimens: Those of Lindheimer, collected in western Texas in 1846; one by Hall, from Dallas; two by Wolf, collected in Illinois in 1875, and very possibly cultivated specimens; and one of doubtful authenticity, by Thomas Bassler, from Manhattan, Kansas. Other herbaria seem to have no better representation of the species, and this could hardly be the case were it so common and so widely distributed as to furnish the well-known cultivated varieties mentioned above.

*Since this description is inaccessible to many students, it will be well to transcribe it here:

Prunus rivularis, Scheele, *Linnæa*, xxi., 594. Frutex 3-6 pedalis; rami angulati glabri nitidi cinerei verruculosi, verrucæ parvæ confertæ. Petioli glandulosi canaliculati puberuli. Folia ovate-oblonga acuminata inæqualiter serrulata, basi glandulosa, subtus spores pubescentia, supra glabra, serraturæ callosæ confertæ. Umbellæ laterales sessiles subbifloræ. Squamæ gemmæ floriferæ aphyllæ. Pedunculi glabri elongati subglandulosi, petiolum æquantes. Flores . . . Drupa rubra globosa glabra nitida acida.

"Gesellschaftlich an Bachrändern, seltener aber jedesmal in Menge zusammenstehenden auf Hügeln. Strauch 3-6' hoch, Frucht kugelig, hell-roth, angenehm säuerlich, von der Grösse einer Kirsche bis zu der einer Mirabelle, $\frac{1}{2}$ -1" dick. Die Tawakong-Indianer sollen die Frucht, mit honig gekocht, sehr lieben. Die Texaner nennen sie 'Tawakong plum.'"—Lindheimer.

Gehört zur Rotte *Eucerasus*, Torr. & Gray.

Seltener stehen die Blumen einzeln.

†The specimens in the National Herbarium were kindly examined for me by Mr. Lyster H. Dewey.

The varieties in question differ from Scheele's description in having single straight trunks, in being from fifteen to twenty feet high, instead of from three to six feet, and in having often three flowers to each fascicle, instead of one or two. The distribution of the species is given by Coulter as "not uncommon on the Colorado and its tributaries, and extending to the upper Guadalupe and the Leona," and the specimens referred to above give no important evidence of its occurrence this side of western Texas. In comparison with this distribution, the origin of the cultivated varieties should be carefully considered. As far as known, their sources are as follows: Cumberland, Tennessee; Garfield, Ohio; Golden Beauty, southwest Texas; Kanawha, Fairview, Kentucky; Leptune, Arkansas; Missouri Apricot, Missouri; Moreman, Kentucky; Sucker State, Illinois; Wayland, Cadiz, Kentucky.

The evidence of this list is quite contrary to the supposition of a *Prunus rivularis* parentage for the varieties named; but, on the other hand, must be regarded as decidedly favorable to their classification in the pseudo-species, *P. hortulana*.

It seems to me important that this group of plums should be understood separately, and that its relationships should be worked out as speedily and as accurately as possible; and while the evidence here reviewed leads me to reject the hypothesis of their derivation from *Prunus rivularis*, that species seems to be a promising one, and we would do well not to lose sight of it too soon.

The Marianna Group

In 1884 a strange plum was introduced from Texas under the name of Marianna. It was said to be a native. It proved to have little value for fruit, however, because it is not very productive and the quality of the plums seems to lack character; but it is found to grow readily from cuttings, and it soon came to be extensively used as stock upon which to graft other kinds of plums, and even peaches and apricots; and it

is still much employed for this purpose in the South. A study* of this new type of plum at once revealed some striking botanical features, and it was found that the De Caradeuc, an older plum, is very closely related to it; and the Hattie is probably to be referred to the same group. This class differs from any of the foregoing in habit of tree, very early flowering, elliptic-ovate, rather small and finely serrate dull leaves, glandless leaf-stalks, and soft, spherical, very juicy plums of a "sugar and water" character, and broad, ovate stones, which are scarcely pointed and are prominently furrowed on the front edge. The botanical position of these plums has been a subject of speculation, to which I have added my full share of confusion by referring them to *Prunus umbellata* of the South. I was soon convinced, however, that the De Caradeuc is a myrobalan plum, and that the Marianna is either the same species or a hybrid between it and some American plum, possibly the Wild Goose. This seemed to be a startling conclusion at the time that it was first expressed, particularly as the Marianna had come to be so extensively used as a stock to replace the myrobalan, which appears to be growing in disfavor. Before entering into detail containing the origin of these plums, it will be useful to our inquiry to clear up some of the history of the myrobalan plum itself.

The myrobalan plum is a foreigner. The word myrobalan (or myrobolan), as a noun, is used to designate various small tropical fruits which are used in the arts, chiefly for tanning purposes. It is now commonly applied to the fruits of the species of *Terminalia*, of the family Combretaceæ, which are imported from

*In Bull. 38, Cornell Exp. Sta. 1892.

India. The word was early applied to a small plum grown in Europe, probably because of some resemblance in size or other characteristics to the myrobalans of commerce. This plum has had a curious history. The first undoubted reference to it which I know is in Clusius' *Rariorum Plantarum Historia*, 1601. Clusius gives a good figure of it, but says that it was not generally known. Some people thought that it came originally from Constantinople, and others that it came from Gaul. Clusius leans toward the latter view. He calls it the myrobalan plum, but does not know the origin of the name. For nearly two hundred years after Clusius wrote, the fruit is described by various authors in different parts of Europe, under the names of myrobalan and cherry plum, during which time doubts were cast upon its European origin. Thus Tournefort in 1700 said that it came from North America. In 1789 Ehrhart* described it as a distinct species under the name *Prunus cerasifera*, or "cherry-bearing plum," and said distinctly that it was a native of North America. Some thirty years before this time, Linnæus had described it as *Prunus domestica* var. *myrobalan*, and gave it a European origin. In 1812, Loiseleur-Deslongchamps† described it as *Prunus myrobalana*, saying that it was supposed to be of American origin. From that time until now the nativity of the myrobalan plum has been uncertain, but European writers have usually avoided the difficulty by referring it to America; and American botanists have for the most part ignored it because it is a cultivated plant. So it happens that this pretty fruit has fallen between

*Beiträge zur Naturkunde, iv. 17.

†Nouveau Duhamel Traité des Arbres et Arbustes, v. 184, t. 57, Fig. 1.

two countries, and is homeless. Sereno Watson, in his "Index to North American Botany," published in 1878, refers Ehrhart's *Prunus cerasifera* to the common beach plum (*Prunus maritima*) of the Atlantic coast. But the myrobalan is wholly different in every character from the beach plum, and it has been long cultivated upon walls in Europe, a treatment which no one would be likely to give to the little beach plum. Torrey and Gray, in 1838, in the "Flora of North America," do not mention the myrobalan plum. After all the exploration of the North American flora, no plant has been found which could have been the original of this plum; while its early cultivation in Europe, together with the testimony of Clusius and other early herbalists, is strong presumption that it is native to the Old World. This conviction is increased by the doubt which exists in the minds of the leading botanists, from Linnæus down, as to its systematic position, for if there is difficulty in separating it from *Prunus domestica*, the original of the common plum, and which is itself a native of the Old World and immensely variable, there is strong reason for suspecting that it is only an offshoot of that species; and this presumption finds strong support in other directions. One need not study far into the European plums until he convinces himself that the essential features of the myrobalan plum are present in several of the wild or half-wild forms of southern and southeastern Europe, no matter what the ultimate origin of the fruit may have been. In recent years a purple-leaved variety of this myrobalan plum has come into cultivation from Persia, under the name of *Prunus Pissardi*. I have no doubt, therefore, that

the myrobalan plum is native to Europe or Asia; and it is full time that an American origin be no longer ascribed to it.

The myrobalan plum has long been used in this country as a stock for various plums. Except upon the Pacific coast, it appears to be falling into disrepute, however, as it dwarfs the cion, and is not suited to all varieties. The endeavor to find some stock which can take the place of the myrobalan has resulted in the popularizing of the Marianna, which, if not pure myrobalan, certainly partakes very largely of it. The myrobalan stock is widely distributed in this country, and bearing trees of it are occasionally seen. The Golden Cherry plum of Downing is undoubtedly this species, and the fruit now known as Youngken's Golden Cherry is certainly myrobalan, and it is probably identical with the variety described by Downing. The fruits may be either yellow or red in various shades. They are round and cherry-like, with a depression at the base, on slender stems, ranging in size from that of a large cherry to an inch and a-half in diameter. The myrobalan is very variable, a fact which finds record and confirmation in the various characters of the stones, as shown in the illustration on page 190.

The first variety of this Marianna or myrobalan type to be introduced as a native plum was the De Caradeuc. This is an early garnet-red plum. It originated with A. De Caradeuc, upon his former farm near Aiken, South Carolina, about the years 1850 to 1854. Mr. De Caradeuc imported some French plums, from the seed of which this variety came. There were several Chickasaw plums in the

vicinity of the French trees, and Mr. De Caradeuc thinks that the variety under consideration is a hybrid, but I am unable to discover any evidence of hybridity. The original tree of the variety "outgrew the parent," Mr. De Caradeuc writes me, "and reached a diameter of head of fifteen feet, was entirely free from thorns and suckers, and bore a remarkably rich and beautiful foliage." The variety was named by P. J. Berckmans, the excellent pomologist of Georgia, and he regards it as pure myrobalan, a conclusion with which I am strongly inclined to concur. Another indication that it may be myrobalan, is the fact that J. W. Kerr, of Maryland, has grown a purple-leaved plum tree from a seed of the De Caradeuc, thus suggesting *Prunus Pissardi*, which is a purple form of the Old World myrobalan.

The Marianna is, in several respects, intermediate between *Prunus cerasifera*, as represented in De Caradeuc, and the native American plums, particularly in the short-stemmed fruit, small, nearly sessile, and clustered, later flowers, and erect, narrow calyx lobes, and spreading habit. It is, therefore, little surprise to learn that the originator considers it a seedling of Wild Goose. It originated as a seedling in a mixed orchard at Marianna, Polk county, Texas, the property of Charles G. Fitzè. So far as I can learn, the seed was not hand-sown, and there is a chance for error in the history. The variety was introduced in 1884, by Charles N. Eley, Smith Point, Texas.

The Hattie and some others are of this group, but I have not traced the history of them.

The Beach Plum Group

The beach plum is a straggling, more or less decumbent bush, reaching three to six or even twelve feet in height, growing in the sands of the sea-coast from New Brunswick to Virginia, and perhaps extending farther towards the Southwest; and also near the head of Lake Michigan, where it has recently been found. The flowers are rather large for the size of

the plant, and are borne on prominent stalks in clusters. The fruit (Fig. 33), is about half an inch in diameter in the best forms, and is deep, dull purple when ripe, and covered with a dense bloom; the flesh is brittle, sweet and juicy, entirely free from the stone; the skin is thick and tough, and usually leaves an acrid taste in the mouth when the fruit is eaten.



Fig. 33.
Beach plum (*Prunus mar-*
itima). Full size

Upon the Jersey coast the fruit is ripe the middle of August.

Prunus maritima, as this beach plum is called, is in cultivation as an ornamental plant, it being very showy when in bloom and interesting in fruit. It succeeds well under cultivation in the interior states. As a fruit plant it has given rise to but one variety, the Bassett's American. This variety is a third larger than the ordinary wild beach plum, but it does not differ greatly in other respects than in size. It was introduced about twenty years ago by Wm. F. Bassett, Hammonton, N. J., who bought the original tree from a man who found it in the neighborhood. It grows

well upon the Wild Goose, and Mr. Bassett writes me that he has a tree on such roots which is fifteen feet high. It was brought to notice largely through the efforts of the Rumson nurseries, in New Jersey, where it was worked upon the myrobalan plum and the peach. I have seen a vigorous, large tree at Mr. Kerr's, in Maryland, grafted upon the Richland, which is *Prunus domestica*. Mr. Kerr also finds that it grows upon the Chickasaws. The variety has small merit.

The beach plum type is variable, and Small has recently described a new species of it, *Prunus Gravesii*, from Connecticut.*

The Pacific Coast Plum

The wild plum of the Pacific coast is the nearest approach to the European type of any plum in the American flora. There is a reason for this in the similarity of climate of our western coast to that of Europe, for similar conditions develop similar plants. It is interesting to note, also, that the pomology of California—with its wine and raisin grapes, olives, figs, almonds, and citrous fruits—is more akin to that of Europe than it is to that of eastern America. This wild Pacific plum is *Prunus subcordata* (Fig. 34). It grows west of the mountains in northern California and southern Oregon. The typical form grows either as a tall shrub or a small tree, but usually not reaching above three to six feet high. The fruit varies from nearly globular to oblong, and is usually dark red and subacid, the flesh clinging tightly to the flat, smooth stone. It is usually unpalat-

*Bull. Torr. Bot. Club, xxiv. 45.

able, and the plant is probably not in cultivation outside of botanic gardens and experimental grounds

There is a form of this Pacific plum which produces attractive fruit, however. This is the so-called Sisson plum, bearing the name of Mr. Sisson, of Strawberry

Fig. 34. Pacific coast plum. (*Prunus subcordata*.) Natural size.

valley, near the base of Mt. Shasta, who has been instrumental in bringing it to notice. This form is known as *Prunus subcordata* var. *Kelloggii* (J. G. Lemmon, Pittonia, 1890, p. 67). The tree is a taller grower than *P. subcordata* itself, the leaves less cordate, and the fruit larger, yellow or red, soft and palatable. Luther Burbank writes me that the twigs of yellow-fruited plants are greenish yellow, and those of the red-fruited plants are reddish brown. He also tells me that seeds of the yellow fruits may produce red

plums, and vice-versâ. This Sisson plum is locally cultivated in parts of California, and it is thought by some to give promise of a new race of plums.

The fruits shown in the accompanying photograph, received from California, were light herryred, marked with many minute golden dots. They were depressed-globular, with a distinct suture, a short stem, and a firm, meaty, rather dry, insipid flesh, and freestones. Mr. Burbank sends me fruits of hybrids of this species with the Robinson (one of the Chickasaws), which are an improvement in quality.

Wickson, in his "California Fruits," writes as follows of the Pacific plum: "Early efforts were made to domesticate these wild plums, and they showed themselves susceptible of improvement by cultivation to a certain extent. In 1856 there was on the Middle Yuba river, not far from Forest City, in Sierra county, a wayside establishment, known as 'Plum Valley Ranch,' so called from the great quantity of wild plums growing on and about the place. The plum by cultivation gave a more vigorous growth and larger fruit. Transplanted from the mountains into the valley, they are found to ripen earlier. Transplanted from the mountains to a farm near the coast, in Del Norte county, they did not thrive. One variety, moved from the hills near Petaluma, in 1858, was grown as an orchard tree for fifteen years, and improved both in growth and quality of fruit by cultivation. The attention of fruit-growers was early drawn to the possible value of the wild plum as grafting stock, and it is reported to have done fairly well on trial. Recently excellent results have been reported from the domestication of the native plum in Nevada county, and fruit

shown at the state fair of 1888 gave assurance that by cultivation and selecting seedlings, valuable varieties can be obtained. It is stated that in Sierra county the wild plum is the only plum which finds a market at good prices, and that cultivated gages, blue and egg plums scarcely pay for gathering. The wild plum makes delicious preserves."

Various Other Types of Plums

We have now explored all those groups or families of native plums which have been impressed into cultivation to any extent for the sake of their fruits. There still remain a few species whose fruits, in the wild state, are sufficiently palatable to attract the experimenter, and which should be mentioned in this narrative.

Sand plum.—The Sand plum of Nebraska and central Kansas is the most important of the plums which we have not yet discussed. So recently has this plum come to be known that it has never had a specific name until Professor Sargent described it as *Prunus Watsoni*, four years ago ("Garden and Forest," vii. 134). It is a compact-growing bush of three or four feet in height, bearing a profusion of small, reddish, juicy fruits (Fig. 35). The inhabitants of those parts of the West where this plum is native collect the better forms in large quantities for domestic consumption, and even sell the fruits in the towns. The plant is also occasionally transplanted to gardens. "The hardiness of *Prunus Watsoni* in regions of extreme cold," writes Sargent, "its compact, dwarf habit, abundant flowers and handsome fruit, make it

an ornamental plant of first-rate value, and as selection and good cultivation will doubtless improve the size and quality of the fruit, it will, perhaps, become a valuable inmate of small fruit-gardens." This sand

Fig. 85. Sand plum. Natural size.

plum is very like the Chickasaw plum in botanical characters, and I think that it is only a modified form of that species, the variation having been brought about by the dry soils and climates in which it grows. It differs from the Chickasaw in its dwarfer habit, thicker leaves and thicker-skinned fruit, and some-

what different stone; but all of these characters are eminently variable in plums, and they seem, for the most part, to be the result of adaptation to habitat. We shall recur to this sand plum in our discussion of the Utah Hybrid Cherry (page 244.)

The latest contribution to our knowledge of the sand plums is the following sketch by Waugh: *

Although it is now nearly four years since Sargent distinguished *Prunus Watsoni* from *P. angustifolia* (C. S. Sargent, Garden and Forest, vol. vii., p. 134, 1894), the individuality of the group does not seem to have made any very decided impression either upon botanists or horticulturists, and material which ought to be referred to this species is still sometimes carelessly classified with the Chickasaw plums. As the group has already given some evidence of utility, and as it may prove of considerably greater importance in the future evolution of American plums, it appears to be especially desirable to have the knowledge of it clearly in the minds of plum students.

The most striking difference between the sand plum and the Chickasaw is that of stature. The sand plum is distinctly a dwarf, seldom growing much higher than a man's head, and sometimes reaching maturity and prolific fruitage at a height of four feet. Beside this, the whole dwarfish appearance is measurably intensified by the short-jointed, often sharply-zigzagging twigs, which give an effect of thorniness. These twigs are apt to be ashy-gray, especially at two or three years of age. The leaves are smaller than those of the Chickasaw plums, and are more finely crenulate upon the margins, but offer no safe distinctive characters. In the most carefully prepared published descriptions of the two species, the few distinctions given are hard to apply. Of *Prunus angustifolia* the calyx lobes are said to be glandular-ciliate, while those of *P. Watsoni* are described as eglandular-ciliate. And while all the garden and herbarium specimens of *P. Watsoni* which I have examined have shown eglandular calyx lobes, so have several of the cultivated varieties of Chickasaw parentage. The two species are evidently closely related, but one who is

* "The Sand Plums," Country Gentleman, January 27, 1898.

acquainted with *P. Watsoni* would seldom be troubled in separating them in the field. With herbarium material alone, a case of doubt would be hard to settle.

The sand plums are confused in several trade catalogues, and in the minds of some persons who ought to keep such things straight, with the sand cherry, *Prunus Besseyi*, and still more seriously with the Utah Hybrid cherry, which Bailey supposes to be a hybrid of *P. Besseyi* and *P. Watsoni*. This confusion is entirely unnecessary, and it is to be hoped that it will quite disappear as soon as attention can be fixed upon the facts.

The natural range of *Prunus Watsoni* seems to be quite circumscribed. Sargent locates it upon "sandy streams and hills, south and southeast Nebraska and central and western Kansas." As a matter of fact, its distribution within this limited range is by no means general. In Kansas, where I have been entirely familiar with it, the sand plum is confined almost exclusively to the sandy lands in the immediate valleys of the Republican and Arkansas rivers and their tributaries, although it is found more sparsely in the Smoky Hill and Kansas River valleys. Mason says: "Have not noted it east of Wabaunsee county." (S. C. Mason, "Variety and Distribution of Kansas Trees," page 8.) The species is commonly reported from Oklahoma, but though I have frequently been as far west as Kingfisher and El Reno, I have never seen it. The dwarf sand plums which I have frequently found in that territory, and which I have sometimes seen brought to the market, were of the species *Prunus gracilis*. Still I think it probable that *P. Watsoni* grows in Oklahoma, at least in some of the western counties. This opinion is strengthened by the introduction of undoubted varieties of this species from the Panhandle of Texas (see below).

Early settlers in Kansas, before their own orchard plantings came into bearing, used to find the sand plums well worth their attention. In July and August everybody for fifty miles back from the Arkansas sand hills used to flock thither to pick, and it was an improvident or an unlucky family which came off with less than four or five bushels to can for winter. Whole wagon loads of fruit were often secured, and were sometimes offered for sale in neighboring towns.

The fruit gathered from the wild trees was of remarkably fine

quality, considering the conditions under which it grew. The plums were quite uniformly large—I would say from memory that they often reached three-fourths of an inch to an inch in diameter. They were thin-skinned and of good flavor, not having the unpleasant astringency of the wild Americana plums, which were also sometimes gathered. They were excellent for canning, and made the finest of jelly. In this connection I may quote F. T. Ramsey, nurseryman of Austin, Texas, who writes me: "As far back as I can remember, I have heard people who crossed the upper plain of Texas speak of the large wild plums that grew there. It seems that in their wild state they grew as large as a Wild Goose."

Naturally, the settlers who went every year to the sand hills for plums brought back trees to plant in the gardens they were opening. Almost every farm within the range mentioned above had a few or many of the dwarf trees growing. Some of these were fruitful and worth their room, but most of them have now died out, or are neglected and forgotten. This is because people have paid no attention to their selection, propagation and cultivation. Further than this, however, the sand plum has often failed signally to come up to its record when transferred to cultivation. It seems not to adapt itself readily to a wide diversity of soils and conditions.

Still, an occasional variety has been deemed worthy of propagation and the distinction of a name. The Bluemont was introduced by E. Gale, of Manhattan, Kansas, during the sixties (Vermont Exp. Sta. Bull. 53, p. 62, 1896). A reliable nurseryman of Junction City, Kansas, writes me that the Bluemont is considered the best variety they have for canning, but it has always been propagated from root-sprouts, which is a drawback to its widest popularity. Recently I have found four other varieties growing in Mr. Kerr's orchards in Maryland, which I have referred to this species (Vermont Exp. Sta., 10th Ann. Rept., p. 106, 1897). These are Strawberry, Purple Panhandle, Red Panhandle, Yellow Panhandle. Strawberry is mentioned by Bailey (Cornell Exp. Sta., Bull. 38, p. 31, 1892), who knew nothing of its history, and is by him put with the Chickasaws, as were all forms of *Prunus Watsoni* at that time. On the same page where Strawberry is mentioned, the author says: "I have plants from Kansas, under the name of 'Kansas Dwarf Cherry,'

which are evidently a bush-like form of this species." These must also have been *Prunus Watsoni*.* The varieties, Purple Panhandle, Red Panhandle and Yellow Panhandle, were introduced from Texas by F. T. Ramsey. Mr. Ramsey says that eight or nine years ago he got a quantity of stock "from various counties in the upper Panhandle proper" of Texas. Besides the varieties named, he had another called Clarendon. He says further: "I have been greatly disappointed in them here, and have dropped them from my catalogue this year, for the one reason that they did not grow large enough. This winter I have been surprised to have several inquiries for them from parties who bought them from me, on account of the enormous crops they bore."

It seems entirely possible that we may yet find ourselves in possession of some valuable varieties derived from this species, though no very sweeping recommendation could fairly be given any variety now known.

At one time and another I have heard a good deal of talk about using *Prunus Watsoni* as a dwarf stock for working other plums, but I never knew of an experiment in that line. The tendency to sprout from the roots would be a defect in using the plants for stocks.

In Maryland, the young growth and blossoms, especially of Strawberry, are severely damaged by the brown-rot fungus, *Monilia fructigena*. In their original wild state, along the Arkansas river, they used to be free from brown-rot, black-knot and curculio, but I lived in that country long enough myself to see them attacked by both curculio and black-knot.

The rivularis plum.—The Towakong or Creek plum, of Texas, is one of which I have no personal knowledge, except from herbarium specimens. It was first brought to notice by the botanical collector Lindheimer, and described in 1848 by Scheele as *Prunus rivularis* in "Linnæa" (xxi. p. 594). This is a bushy plant, three to six feet high, which Gray speaks of as

* The supposition is correct. Both the Strawberry and the Kansas form are *Prunus Watsoni*.—L. H. B.

"verging to Americana." It grows on the banks of streams and margins of bottom-woods, mostly in thickets. The fruit is said to be very agreeable. Scheele describes the fruit as the size of cherry to that of a mirabelle (myrobalan plum), half an inch to an inch thick, spherical and red. The Towakong Indians boil it with honey, and use it for food. Coulter, in his "Flora of Western Texas," says that this plum is "not uncommon on the Colorado and its tributaries and extending to the upper Guadalupe and the Leona." It is not in cultivation. It evidently bears much the same relation to the *Prunus Americana* that *Prunus Watsoni* does to the Chickasaw plum* (see pages 207, 208).

The southern sloe.—The black sloe of the southern states, *Prunus umbellata*, attains a height of twelve to twenty feet, and the foliage is somewhat like narrow-leaved forms of the myrobalan plum. It is distributed in the maritime districts from South Carolina to Texas, reaching north, in its southwestern ranges, to southern Arkansas. Sargent says, in his "Silva," that "the fruit is gathered in large quantities and is used in making jellies and jams." In Florida it is sometimes called Hog plum. Fruit sent me from that state was orange-yellow, with faint blushes of red, or some specimens pure yellow, with a thin bloom, freestone, very sour and bitter. A Texas correspondent writes that the fruit is usually unpleasant or disagreeable, but that an occasional form bears large and good fruit. *Prunus umbellata* is not in cultivation for its fruit, and it is not likely that it can compete in

*Scheele's *Prunus Texana*, of which there is a duplicate type in the herbarium of the Missouri Botanical Gardens, is *Prunus Americana*. See p. 184.

fruit-bearing merits with the Chickasaw and hortulana plums.*

The *Alleghany plum* is a small tree or straggling bush, closely allied to *Prunus Americana*, which occu-

Fig. 36. Alleghany plum Natural size.

pies a very restricted range in the mountains of central Pennsylvania. The species was distinguished

*Since this account was sent to the printer, John K. Small has published a new species, *Prunus injucunda*, closely allied to *P. umbellata* (Bull. Torr. Bot. Club, xxv, 149). It has an oblong, very bitter fruit, and grows on Stone Mountain, N. W. Georgia

from the Americana plums nearly forty years ago, but it was not described as a distinct species until 1877, when Professor T. C. Porter named it *Prunus Alleghaniensis*. According to Sargent, "the fruit is collected in large quantities, and is made into excellent preserves, jellies and jams, which have a considerable local consumption." He holds the opinion that it "will probably be improved by selection and cultivation." As I have grown the Alleghany plum, it makes an upright small tree, and bears rather freely of small, hard, spherical plums (see Fig. 36) of dark purple color, with a decided bloom, and acerb and uneatable in quality. Its merits as a fruit-bearing plant seem to be so inferior to those of the Americana plums, that I do not look for any attempt to ameliorate the species for many years to come.

NOTE.—Persons who wish to follow the details of varieties and methods of cultivation of the native plums should consult Goff's excellent account of "The Culture of Native Plums in the Northwest," Bull. 63, Wis. Exp. Sta. Oct. 1897; also Waugh's "Pollination of Plums," Bull. 53, Vt. Exp. Sta. Aug. 1896, and 10th Rep. Vt. Exp. Sta. 1896-7. A good account of the botany of plums and cherries, by Bessey, may be found in Rep. Nebr. Hort. Soc. 1895. See, also, Waugh, Bot. Gaz., July, 1898.

The Native Cherries

North America has little to attract the experimenter in the way of native cherries. Most of the tree cherries belong to the racemose type, the flowers being borne in more or less elongated clusters, of which the lowermost—those nearest the parent shoot—open first. This type of cherries has never given important results in the amelioration of the fruits in any part

of the world. The chief historic representative of this class is the Padus or bird cherry (*Prunus Padus*) of the Old World, of which our choke cherry (*Prunus Virginiana*) is the occidental congener. There are occasional forms of the Padus which bear fruit of some merit, but they are wretchedly inferior to the improved forms of the umbellate-flowered or garden cherries. Now and then one finds a choke cherry bush which bears more pulpy and more pleasant-tasted fruit than is the wont of the species, but even these variations offer little temptation to the cultivator. The choke cherry is cultivated for ornament, however. It is scarcely inferior for that purpose to its Old World congener (*Prunus Padus*), although its flowers are somewhat smaller than in that species, and they are also a few days earlier. If grown as a lawn tree where a symmetrical development can be secured, the choke cherry, both in bloom and in fruit, is an attractive object. Although rarely more than a large tree-like bush, the choke cherry is often confounded with the wild black cherry, but it is readily distinguished by the very sharp small teeth of the leaves. The fruit of the choke cherry is commonly red, but amber-fruited plants are occasionally found.*

The choke cherry is undoubtedly capable of some improvement under cultivation. Even in a wild state, the fruit is capable of yielding acceptable jelly.† Ameliorated varieties of the choke cherry are occasionally described, but there is a suspicion that

**Prunus Virginiana* var. *leucocarpa*, Watson, Bot. Gaz. xlii. 233.

†See, for example, F. A. Waugh, Garden and Forest, ix. 388, and J. E. Learned, l. c. 408.

some of them may be the European bird cherry, *Prunus Padus*, which is distinguished from the choke cherry with difficulty, and which is often grown here for ornament. The following extracts show to what extent these fruits have yet appealed to the cultivator:

THE CHOKE CHERRY IN CULTIVATION.*—Recent notes in "Garden and Forest," as well as other sources of information, seem to indicate that the choke cherry is unknown to cultivation. Such is not the fact, although its use is apparently limited and local. One of the earliest recollections of my boyhood has to do with two or three choke cherry trees beyond the garden in the edge of the old orchard, and I can almost feel their pucker yet, and I recall the feeling of danger when some older companion would utter the grave warning never to drink milk after eating choke cherries. These could hardly be called cultivated choke cherries, however, and the trees were simply spared where they had chanced to spring up.

In distinct contrast with this puckering little fruit I call to mind another kind, always spoken of as the "tame" choke cherry. The merits of this fruit may have seemed greater than the reality, since none of it was to be found on our own farm. Still, any boy would call this fruit good, and when prepared for the table, boys still call it good, no matter what may be their age. The botanical characters of the tree appear to be the same as those of the wild choke cherry, *Prunus Virginiana*, though the tree reaches a larger size than that commonly reached by the shrubs along the fence rows. In this cultivated form the trunk often reaches a diameter of from four to six inches, and the tree attains a height of fifteen to twenty feet.

The fruit is much larger than in any wild forms which I have seen, perhaps ranging from three-eighths to half an inch in diameter. It also has much less astringency, and whatever remains of this entirely disappears with cooking. The fruit is much used, both for pies and sauce, and is also canned for winter use. Any criticism as to its quality in these forms would be that

* Fred W. Card, *Garden and Forest*, x. 47 (1897).

it lacks in pronounced flavor rather than that it possesses any strong or unpleasant ones. It does not make a rich sauce, but one which is, on the whole, very cooling and agreeable.

It is not necessary to cook the fruit in order to dispel its astringency. Those most familiar with its use have learned that when the fruit is fully ripe, if it is put into a cloth sack and rolled back and forth or shaken in a closed vessel, this quality disappears. Treated in this way and served with sugar and cream, like peaches or other fresh fruit, it is a dish by no means to be passed by. I do not remember that the fruit was ever used for jelly, but, of course, it might be and perhaps is.

There are certain qualities possessed by this fruit which seem to make it worthy of being better known than it now is. In the first place, it ripens at a time when other cherries are gone. Furthermore, the tree is uniformly productive, seldom, if ever, failing to yield a crop. Although small, the fruit is borne in clusters, so that it is quickly and easily picked. It also has the quality of remaining a long time on the tree after ripening, which is a desirable feature for home use. The tree is apparently well able to care for itself, for all of those which I have observed have been growing absolutely without care. It seems, further, that it must have few serious enemies, otherwise it would not prove so uniformly productive. As to its longevity I cannot testify. Among the trees of my earliest remembrance several are gone, while others, when I last saw them, were still yielding their annual crop of fruit.

The chief objection against this little recognized claimant for admission to our gardens is its small size, and the consequent number of pits. If the suggestion of one of your correspondents for a pitting machine were to take tangible shape, it would add greatly to the importance of this fruit. Indeed, there seems to be no reason why such a machine should not be as readily devised for cherries of this size as for larger ones. It is possible that the same machine might answer for both, for in size these fruits are about intermediate between the wild choke cherry and the Early Richmond. As commonly served, the pits are left in, and in that case it becomes largely a question of leisure, for while they are easily removed, it takes time to do it.

So far as I have learned the history of this fruit from inquiries made in northern Pennsylvania where I have known it, the original trees were brought to that region from Connecticut by one of the older settlers. The trees sprout from the roots to some extent, and these sprouts have served as a means of distribution in this farming community, so that it is not at all an uncommon fruit in that immediate vicinity. As to its remoter history I know nothing. Probably it is merely an improved form originally selected from some hedgerow. The variation in size of fruit which these wild groups present certainly lends color to such a supposition.

Craig comments on this article as follows:*

I was very much interested in the letter of Professor Card, which appeared in your issue of February 3d, on "The Choke Cherry in Cultivation." I send you this note to corroborate the statement of Professor Card, and to say that in the clay flats of the Province of Quebec, bordering the Richelieu and St. Lawrence rivers, the choke cherry is one of the principal fruits cultivated by the French habitant. This is owing largely to the character of the soil, which is of the pronounced blue-clay stamp and of the stickiest and most impervious type. In this region the choke cherry may be found in almost every French garden. It is cultivated mostly in tree form, and multiplied by means of the suckers which spring up about the roots. A great many variations occur. Fruit large and small, light and dark, astringent and non-astringent, may be found. Two years ago I found a tree bearing large clusters of yellowish white cherries. I have sown the seed of these, and am watching the young seedlings with interest, hoping that improved forms may appear. The French use this fruit in many ways, but it is most largely partaken of uncooked, next as preserves, while a smaller proportion is made into jelly. The tree is hardier than the wild black cherry, *Prunus serotina*, and is found all through the northwest territories, even upon elevated portions of the foothills of the eastern Rockies.

*Garden and Forest, x. 68.

A periodical has the following sketch of improved choke cherries from H. Knudson, an experimenter in Minnesota: "I have three improved varieties of choke cherry, which I have numbered 1, 2, 3. They all differ from the common type of choke cherry, both in leaf and bud, and especially in fruit. No. 3 is the greatest departure from the original type, and when its leaves are fully developed, is readily distinguished from any other sort by its leaves alone. Nos. 1 and 2 are of slender, upright growth, and attain a height of twenty to twenty-five feet. No. 3 is of a rather more spreading habit.

"They are all thrifty growers, so far free from disease, and good annual bearers, producing the best fruit of its class I have ever tasted, having very little of the astringency common to the race.

"There certainly appears to be an inclination in this fruit to break away from the original type, and inasmuch as they possess in a high degree those qualities that are found lacking in our cultivated varieties, imported from Europe; viz., health and hardiness, may it not be best for us to turn some of our efforts toward developing the native cherry, as well as the native plum?"

Upon the plains and westward, *Prunus Virginiana* is represented by *Prunus demissa*, which has thicker leaves with less pronounced teeth, and mostly longer racemes of better fruit. Wickson says that in California "the wild fruit is used to some extent for marmalade. It has been cultivated to some extent in places near its habitat." It has also been used for stocks for garden cherries. This western cherry was introduced into the plant trade in 1881 by Edward

Gillett, Southwick, Massachusetts, as an ornamental plant.

Prunus serotina, the wild black, or rum cherry, the wood of which is often used for cabinet work and house furnishing, is planted for forestry purposes, as an ornamental tree, and sparingly for its fruit



Fig. 37. Wild black cherry. *Prunus serotina*. One-third size.

(Fig. 37). Infusions of the bark are used for medicinal purposes, and the fruit is often employed in the manufacture of cherry brandy, or as a flavor to rum. Occasional trees bear fruit of unusual size and attractiveness, but it is doubtful if any sustained attempt will ever be made to develop it into a fruit plant. As an ornamental plant, the wild black cherry possesses decided merits in its attractive habit, clean, shining foliage, striking white racemes and handsome fruit. There are several cultivated varieties: *pendula*, a weeping form, worked standard-high; *variegata*, with leaves more or less discolored with yellow;

golden-leaf, found wild by Jackson Dawson, of the Arnold Arboretum, and somewhat disseminated, and probably essentially the same as *variegata*; *carthagenae*, with small, short-elliptic or ovate-elliptic leaves. *Prunus serotina* ranges through the eastern and southern states as far west as Kansas.

Prunus Pennsylvanica, the bird, wild red, pigeon or pin cherry, is occasionally cultivated for ornament, although it is not so well known as its merits deserve. It sprouts badly, a feature which no doubt discourages its dissemination. The species has been lately recommended as a stock for the common orchard cherries. The union with the orchard cherries, both sweet and sour, appears to be good as a rule, and the species certainly possesses promise as a cheap and hardy stock in climates too rigorous for the ordinary cherry stocks. The fruit is sometimes used in the preparation of cough mixtures, but is never edible. It is generally distributed throughout the northern half of the Union from the Atlantic to Colorado.

The Dwarf Cherry Group

There is one well marked group of native cherries which seems to be destined to play an important part in the evolution of American fruits. This includes two or three bush cherries. They are just now beginning to attract the attention of experimenters, and already hybrids between one of them and the true plums have been produced. It is fortunate that the history of the group is now written, before it has become so profoundly modified by domestication that it is not necessary to invoke speculation to determine

Fig. 38. Common sand cherry. *Prunus pumila*.
Nearly two-thirds natural size.

the genesis of garden forms. And yet even here, upon the very threshold of their introduction into domestic gardens, we shall find certain points which can be understood or explained only by inference.

These dwarf cherries are the American congeners of the ground or dwarf cherry of Europe and northern Asia, which is known as *Prunus Chamæcerasus*, and which is in cultivation in this country for ornament. This European plant is so like our own that it has received the name of *Prunus pumila*—which is the American plant—from nurserymen who have been instrumental in disseminating it. There are two species of dwarf cherry which are concerned in this contemporaneous evolution, but only one of them seems to promise much under domestication. These are the sand cherry (*Prunus pumila*, Fig. 38), and the western dwarf cherry (*Prunus Besseyi*, Fig. 39). The history of this dwarf cherry group was first written by the present author less than four years ago ("The Native Dwarf Cherries;" Bulletin 70 of the Cornell Experiment Station), and it was upon that occasion that the western plant was separated from the eastern plant, and designated as *Prunus Besseyi*, in compliment to Professor Charles E. Bessey, of the University of Nebraska, who has often called attention to the merits of the fruit.

Of these two cherries, the better known to botanists is the common dwarf or sand cherry of the East, *Prunus pumila*, which grows chiefly upon sandy and rocky shores from northern Maine to the District of Columbia and northwestward to Lake of the Woods. It is abundant among the Great Lakes, where it often grows in drifting sand. The plant is strictly erect

when young, but with age the base or trunk becomes reclined, and often covered with sand; but the young growth maintains its erect character. The

plant has long and narrow, sharply-toothed leaves and a willow-like habit. This sand cherry is variable in its wild state, especially in its fruit. As a rule, the fruit is small and very sour and scarcely edible, but now and then one comes upon a bush which has fruit of pleasant flavor, and as large as small Early Rich-

mond cherries. The illustration, Fig. 38, shows the ordinary type of fruit of the sand cherry, nearly natural size. The fruit is ordinarily black, always without bloom, and in New York ripens late in July and early in August. It is very abundant on the sand dunes of Lake Michigan, where it makes a shrub from five to ten feet high, and bears very profusely of variable fruits. Some of these natural varieties are large, sweet and palatable, and at once suggest an effort to ameliorate them. The fact that the plant grows in the lightest of sand suggests its use for poor or arid regions, which are present in most states, and upon which few or no crops can be grown with profit. This cherry was advertised in the Midway Plaisance at the World's Fair, 1893, by Martin Klein & Co., of Detroit. The plant was said to have probably come from Japan, but it was the ordinary *Prunus pumila* of our eastern states. The plant was recommended chiefly, it seems, for some medicinal virtue which was said to reside in its red roots, although its merits as a fruit plant were not overlooked. Unfortunately, there are no named varieties of this sand cherry on the market, and very little attention has been given to it by experimenters. It has less merit as a fruit plant than the next species, but it is nevertheless worth attempts at improvement.

The western sand or bush cherry (*P. Besseyi*) grows on the plains from Manitoba to Kansas, and westward to the mountains of Colorado and Utah. It is in cultivation as the Improved Dwarf Rocky Mountain cherry, introduced in 1892 by Charles E. Pennock, of Bellvue, Colorado. It has received attention at many experiment stations. This species is a dwarfer and more

compact and bushy plant than the sand cherry, and it has a denser and better foliage. The cherries are frequently as large as those of the Early Richmond, and are often very palatable. The fruits are variable in shape, from nearly globular to oblong-pointed. It is from this species that the best results are to be expected in a horticultural way; and from the fact that it grows over such a great area of the interior plains, I expect that it will be found to adapt itself to most trying soils and situations.

This dwarf cherry is not mentioned in the Rocky Mountain botanies, although there can be no doubt that it is wild in Colorado and Utah. Dr. C. C. Parry collected it in eastern Colorado in 1867, and apparently the same was found somewhere in the Rocky Mountains, presumably in Colorado, in 1888, by S. M. Tracy. It was collected even so long ago as 1839 by Geyer, in Nicollet's famous expedition, being found on "arid sandy hillsides of the upper Missouri." I remember with great distinctness, that a "Rocky Mountain cherry" grew in my father's yard from my earliest boyhood. Pits were brought by a friend from Pike's Peak in an early day. As the western botanies do not mention any dwarf cherry, I had always been puzzled over this friend of my earlier years.

The horticultural history of the plant seems to begin with A. S. Fuller's "Small Fruit Culturist," 1867. Mr. Fuller mentions having collected the sand cherry (the true *Prunus pumila*) upon Hat Island, in Lake Huron, in 1846. But he also had this western species. "A few years ago," he writes, "through the kindness of Professor George Thurber, I received some

cherry seed from Utah Territory." He raised plants from these seeds, and noticed that the plants were different from those which he had found upon Hat Island. "I do not consider this cherry of any particular value as it is found in its normal condition," he continues; "but if we could obtain an improved variety of a similar growth, and as hardy and productive, it would certainly be a great acquisition. There is no reason why this should not be accomplished, for, as I have said, it is nearly related to our cultivated varieties, and a hybrid can, and probably will be, produced between them." Now, after the lapse of a quarter of a century, the fulfillment of this generous prophecy is in sight.

In 1888, Gipson, in "Horticulture by Irrigation," speaks of the wild native Colorado dwarf cherry as bearing a fruit "especially valuable for pies and preserves, and is often pleasant to eat from the hand. It is wonderfully productive, and will survive all changes and vicissitudes of the most exacting climate." In 1889, Professor C. E. Bessey called the attention of the American Pomological Society to it as "a promising new fruit from the plains" of Nebraska. It is only within the last five or six years, however, that the sand cherries have come into actual cultivation for their fruit, although as ornamental plants they have been sold many years. Professor C. A. Keffer described a dwarf cherry in 1891, in a bulletin of the South Dakota Experiment Station, and a little later Professor Green, of Minnesota, did the same. Both men had grown it, and found it to be variable and promising. In South Dakota plants set three years bore heavily the second and third years. The

"fruit begins to ripen the first week in August. The cherries on most of the bushes were ripe by August 20, and some few last into September, showing a season of from four to six weeks in a seedling plantation. Classifying roughly according to the fruit, we find yellow and black-fruited sorts. The yellow-fruited sorts, as a class, are earlier than the blacks, and of rather better flavor. They are greenish yellow when fully ripe, and vary in size, the largest being about the size of a medium Early Richmond cherry." The fruits vary greatly in flavor, some being entirely worthless, while others were acceptable for some culinary purposes. "While of little value when the quality of the fruit is considered, it would seem that these dwarf cherries should give rise to a race especially adapted to the Northwest. They have withstood all the dry weather of the past three years without injury, and they have been covered with bloom for two seasons, though unprotected during the winter." Professor Green, in Minnesota, had "fruit varying in color from quite light red to almost black, and in form from round-oblate to oval. The largest fruit we have is oval, with three-fourths inch and five-eighths inch diameters, while one other is round and eleven-sixteenths of an inch in diameter; this is nearly as large as the Early Richmond cherry. The quality varies greatly, some being a mild, not disagreeable subacid, others insipid, and still others very astringent. * * * When cooked it makes a nice sauce. The period of ripening varies from July 24 to August 15. A peculiarity of the plant is that all the fruit on any plant is ripe at nearly the same time, and can all be gathered at one picking. * * * I

consider this cherry not only of prospective value for its fruit, but of immediate value as a hardy shrub."

Professor Budd and others suggest its use as a dwarf stock for cherries, while it is found to grow well, for a time, at least, upon the peach. Finally, Charles E. Pennock, of Bellvue, Colorado, introduced the "Improved Dwarf Rocky Mountain cherry," a description and history of which follow, made in 1892, by the present writer, in his "Cultivated Native Plums and Cherries" (Bulletin 38, Cornell Experiment Station):

Mr. Pennock's "Improved Dwarf Rocky Mountain cherry" is the only named cultivated form, so far as I know, of pure *Prunus Besseyi*. His first account of this fruit, as given in the "American Farm and Horticulturist" for April, 1892, is as follows: "I have never seen a bush more than four feet high. They should be planted about eight feet apart, as they grow on the ground. The first I ever saw or heard of it was in 1878. I was making and floating railroad ties down the Cache la Poudre river, in the mountains, about eight miles from my present farm. I thought at that time they were the most valuable fruit I ever saw growing wild. I got a start of these cherries, and have been improving them by planting seed (pits) of the best fruit. They vary somewhat in size, flavor, and season of ripening, and are capable of great improvement. I have known only one bush that was not good in my experience with it. We have nearly all kinds of fruit, but we like the cherry to eat out of hand when fully ripe better than any of its season. It ripens a month later than Morello—

in fact, I picked them off the bushes and exhibited at our county fair September 23, 24 and 28, where they attracted a great deal of attention. I have learned since I have had these cherries that other residents of the county had them in their gardens more than twenty years ago, and have them yet, so I do not claim to be the discoverer of them, but I believe I am the first to improve them and make their value known to the public. They are very scarce in their wild state here. There are two kinds of them—one that grows outside the mountains in the foot-hills, and is in every way inferior to the one that grows near the bank of the Cache la Poudre river. There are not 2,000 of these cherries of mine in existence. I could sell wagon loads of these cherries at 10 cents per quart. I have kept 200 of the young trees, which I intend to send to responsible parties who desire them for testing. The young trees I have are one year from seed. I have had them loaded down at two years of age from seed. They have never failed to bear fruit every year; late frosts never affect them; they are entirely hardy, having endured 40 degrees below zero without injury; ripen when all others are gone; would grace any lawn when in blossom; are easier pitted than other cherries."

Bessey writes as follows of the merits of this cherry:* "No native fruit appears more promising than this. Even in a wild state it is very prolific, and when fully ripe it is edible in the uncooked state. The astringency which is present in the unripe fruits almost or entirely disappears at maturity. Plants

*Rept. Nebr. Hort. Soc. 1895, 168.

appear to differ a good deal in the amount of astringency, as well as in the size and shape of the cherries which they bear. In many parts of the state the sand cherry has been transplanted to the garden or orchard. Wherever this has been done the results have been encouraging. The plants become larger, and the cherries are larger and more abundant. They root freely from layers, and hence are propagated with the greatest ease. My studies of this interesting native cherry, supplemented by the testimony of numerous observers in all parts of the state where it grows, lead me to the conclusion that we have here a fruit which needs only a few years of cultivation and selection to yield us a most valuable addition to our small-fruit gardens. It has recently attracted the attention of cultivators in the states eastward as a promising stock upon which to graft or bud some of the more tender varieties of the cultivated cherries of the Old World."

The efforts to improve *Prunus Besseyi* by means of crossing have been made chiefly in Minnesota. Professor S. B. Green, of the Minnesota Experiment Station, writes (1894) that he has "raised probably five thousand seedlings in the last four years, and has seen many seedlings on the grounds of the Jewell Nursery Co., at Lake City, Minn. Among these I have seen many that produce very good fruit, but I have not yet selected the one which I shall propagate. I have attempted quite a number of hybrids between it and *Prunus Americana*, but have so far failed to get one that I felt sure represented both species. It is a very good stock for the *P. Americana*. It suckers very freely the first season, but when the graft or bud gets

a good start there is but little trouble from this cause. The Russian cherries bud on it fairly well, but do poorly when grafted. I think the round fruits are much more often of good quality than those having a pointed apex." Mr. C. W. H. Heideman, of New Ulm, Minnesota, has been at work about ten years in endeavoring to secure crosses of *Prunus hortulana* (as the Miner) upon *Prunus Besseyi*, with good success. He informs me that all his pollinations are made upon emasculated and protected flowers. He has made some five hundred distinct crosses, some of them with pollen of *Prunus Americana*, but the issues of this latter combination "are all very weak, and I am afraid," he writes, "that they will not pull through." It is yet too early to determine what the practical results of these crosses may be, but I am looking for something useful for the Northwest and for many of the dry lands of the East. A hybrid of these species is shown natural size in Fig. 40. It is an oblong dull red plum, with rather meaty and sweet flesh, a sourish skin, and a rather large stone. The Compass cherry, being introduced by H. Knudson, is said to be a hybrid of this cherry with *Prunus hortulana*.*

Perhaps the most interesting of these derivatives of the western dwarf cherry is the variety known as the "Utah Hybrid cherry" (Fig. 41). All botanical evidence goes to show that the plant is a hybrid of *Prunus Besseyi* and the sand plum, *P. Watsoni*; and its history† bears out this statement.

*Consult Minn. Horticulturist, Apl. 1896, 132, and Oct. 1896, 416.

†First given in "The Native Dwarf Cherries," Bull. 70, Cornell Exp. Sta., 1894. By Dieck, the plant has been named *Prunus Utahensis*.

The Black Utah Hybrid cherry,—which, I think, is the one now in cultivation,—originated with J. E. Johnson, now deceased, at Wood River, Nebraska, on or near the Platte river, probably some

Fig. 40. Hybrid of the western sand cherry with the Miner plum.
Natural size.

time in the sixties. Mr. Johnson grew native dwarf cherries and sand plums in his garden. Seeds of these cherries were sown. Only one tree of the original batch of cherry seedlings was considered worthy of attention, and this tree was propagated. Mr. Johnson soon afterwards moved to Utah, from whence, it appears, he distributed this variety as the Utah Hybrid cherry. There is no species of plum or cherry known to which this Utah Hybrid can

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a natural hybrid be-
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a Mr. Johnson's gar-
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between the western
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ition shows the Utah
l, half natural size,
as grown by myself.
It is a very hand-
some fruit of deep
mahogany color, with
a light plum-like
bloom, ripening about
the first of August
at Ithaca. The qual-
ity is poor. The
flesh is soft and
juicy, and rather
pleasant, but it
lacks body; and the
skin, in our speci-
mens, is very bitter.
The pit is very like
that of *Prunus Bes-
seyi*. The plant is a
tree-like bush three
or four feet high,

with a tendency, evidently derived from the sand plum, to make a zigzag growth of shoots. The foliage has every appearance of being a combination of the dwarf cherry and the sand plum. The leaves are slightly trough-shaped, or conduplicate, as they hang on the plant, while those of the sand plum are strongly conduplicate, and those of the cherry are perfectly flat. In outline, the leaves are oblong-ovate. They are dull glossy above and much reticulated beneath, with rather coarse, obtuse serratures, and a firm, thick texture.

The Utah Hybrid cherry, as I have grown it, appears to possess no immediate value, because of the pooriness of its fruit; but the tree is hardy and productive, and it indicates that there may be combinations of dwarf plums and cherries which shall have distinct horticultural merits, particularly for dry or arid soils and trying situations. It also shows how evanescent is the line of demarcation between the cherry and the plum.

Retrospect

We have now traced in some detail the curious and intricate history of the evolution of cultivated varieties of our native plums and cherries. We have seen that, although the varieties already named and impressed into domestication number something like two hundred, the greater part of them have been merely fortuitous or accidental variations, and that the history of even the oldest of them runs back scarcely more than three-fourths of a century, whereas most of them are very recent. Five accepted species or

types of native plums and one or two of native cherries have entered into this domesticated flora, and hybrids have appeared not only between native plums, but probably between native and foreign species, and between the native plum and the peach; and hybrids have even arisen between the plum and the cherry. Of late years, too, another and distinct species of plum has been introduced from Japan. It is attracting attention from fruit-growers in every part of the Union, and is slowly adapting itself to the new environments, and it must soon meet and blend with some of the native species. There are already reports that such nuptials have been made. A half dozen native species not yet brought into cultivation are inviting the attention of the experimenter. In the meantime, the interest in commercial plum culture is increasing rapidly, and the enterprise is each year carried into new and untried regions. Of all the books which have been written upon American horticulture, not one of any consequence has been given wholly to the plum. To the student, our native and domestic plum flora will long remain the most inviting, perplexed and virgin field in American pomology.

IV

THE NATIVE APPLES

FIVE types of native apples are known in the United States. These are, the common wild crab of the northeastern states and Canada, the narrow-leaved crab of the middle and southern states, the prairie-states crab, the Soulard crab, and the Oregon crab. None of these are of sufficient merit to have attracted much attention for their fruits, from the early settlers, although many early narrators mention them. John Smith saw "some few Crabs, but very small and bitter," upon coming to Virginia. Strachey records: "Crabb trees there be, but the fruit small and bitter, howbeit, being graffed upon, soone might we have of our owne apples of any kind, peares, and what ells." The crabs of the eastern states are mentioned and described by many early naturalists and botanists, but these records contain so little of prophecy for the fruit, or even interest in it for food purposes, that we do not need to examine them. The European apples were so much superior, and thrived so well upon introduction into the New World, that the wild crabs offered little reward in the comparison.

What man neglected to perform for himself, nature did for him, for there have now come into existence certain named and worthy varieties of apples which have sprung from the native stock. Before enquiring of the history of these varieties, however, it will be

necessary to take a brief survey of the various indigenous stocks.

The Indigenous Species

We will first simplify our account by disposing of the Oregon crab, since it is not in cultivation for its fruit. This species ranges from Alaska to northern California. It is the largest-growing species of native apple, making a tree twenty-five to forty feet high. It received its name, *Pyrus rivularis*—the "creek Pyrus"—from Douglas in 1833. The species is more like the Old World apples, especially the Siberian crab, than our other indigenous apples. The leaves are ovate and apple-like in shape, usually smooth, and only rarely notched or lobed, but uniformly finely serrate. The little fruits are oblong, three-fourths inch or less long, with a scant, dryish flesh, and yellow or reddish in color, ripening in September and October. The calyx falls before the fruit is fully ripe, as it does in the Siberian crab. According to Sargent, "the fruit, which has a pleasant subacid flavor when fully ripe, is gathered and consumed by the Indians." He quotes Robert Brown as follows: "The fruit of the crab-apple (*Pyrus rivularis*) is prepared for food by being wrapt in leaves and preserved in bags all winter. When the apples have become sweet, they are cooked by digging a hole in the ground, covering it over thickly with green leaves and a layer of earth or sand, and then kindling a fire above them." Wickson, in his "California Fruits," speaks of specimens of this crab tree "with bodies one foot in diameter, with spreading tops, loaded with small,

oval fruit, of a golden color when ripe." He adds that the fruit of this Oregon crab "is eaten by Indians, and was used in early times for jelly making by the white settlers."

The wild apples of the Mississippi valley and eastward have usually been distinguished into two species, the *Pyrus coronaria* or garland crab of the North, and the *Pyrus angustifolia* or narrow-leaved crab of the South. Within the last generation or two, botanists and experimenters have occasionally called attention to these crabs as the possible parents of improved varieties, but nothing very definite appears to have been put on record until the present writer made an essay in this direction a few years ago ("American Garden," August, 1891), in which two new species or types of *Pyrus* were proposed, and in which an effort was made to discover the botanical features of certain cultivated forms of them. At this point we must examine the botanical features of the two old-time species of eastern crabs, and of the prairie states crab, which was there proposed as a distinct species.

1. The wild or garland crab of the northeastern states (*Pyrus coronaria*, Linnæus). Leaves short-ovate to triangular-ovate, sharply cut-serrate and often 3-lobed, thin and hard, smooth, on long and slender but stiff and hard, smooth petioles; flowers large (over an inch across), on long ($1\frac{1}{2}$ to 2 inches) and slender, stiff, smooth or very nearly smooth pedicels, the calyx smooth, or very nearly so, on the outside. A small, slow-growing and spreading, thorny tree, growing in glades from New York to Michigan, and even to Missouri and Kansas and southwards, probably, to Georgia.

It is in cultivation as an ornamental plant ("*Pyrus coronaria odorata*"), but it appears never to have been grown for the economic uses of its fruit. The fruit is always distinctly flattened endwise, clear yellowish green at maturity, without spots or dots; stem very slender, but varying in length, the cavity small and regular; basin (at apex of fruit) symmetrical, rather deep but broad, and marked by regular corrugations, the calyx small and smooth. Various aspects of this crab apple are shown in Figs. 42-45.

2. The wild or narrow-leaved crab of the Southern states (*Pyrus angustifolia*, Aiton). Leaves lanceolate-oblong to elliptic, small, varying from almost entire in the inflorescence to bluntly and mostly sparsely dentate-serrate, obtuse or bluntish (only rarely half-acute), stiff and firm and polished above, as if half-evergreen, on short (usually an inch or less) and hard, smooth or nearly smooth petioles; flowers habitually smaller than in the last, on very slender but shorter, smooth pedicels, the calyx smooth, or essentially so, on the outside. A small, hard-wooded tree, growing from Pennsylvania to Tennessee (and southern Illinois?) and Florida. Dr. Gattinger, of Nashville, Tenn., writes me that the species is "confined to the siliceous sub-carboniferous formation, and I have never seen it on the silurian limestones around Nashville." *Pyrus angustifolia* is more easily confused with *P. coronaria* than the western forms of crabs are. The best character of distinction between *P. angustifolia* and *P. coronaria*, it seems to me, is the thick, half-evergreen, shining leaves of the former—a character which appears to have been omitted in the later books. I presume that it was this character of leaves

Fig. 42. The garland crab. *Pyrus coronaria*.

Fig 43 The common garland crab (*Pyrus coronaria*) of the eastern states. One-third natural size

which led Desfontaine to call the species *Malus sempervirens*, "evergreen crab apple." *Pyrus angustifolia* is thus characterized by Torrey and Gray in 1848, and the description is excellent: "Leaves lanceolate-oblong, often acute at base, dentate-serrate or almost entire, glabrous, shining above." It is said that the styles

Fig. 44. *Pyrus coronaria* from Pennsylvania. Nearly natural size.

in *Pyrus angustifolia* are distinct, while they are united in *P. coronaria*, but this character does not hold. The coherence of the styles in all these wild crabs, as in the apple itself, is very variable, and it seems to me to be entirely unreliable as a distinguishing mark. These species have been confused from the earliest

times. For example, Michaux left two specimens of *Pyrus angustifolia* in his herbarium at Paris, one of which is ticketed *Malus angustifolia* and the other *Malus coronaria*,—the latter said to grow in "Pennsylvania et Virginia."

Pyrus coronaria and *P. angustifolia* are essentially smooth species, and the young wood is dense and hard. The young leaves and shoots are sometimes thinly hairy, but they soon become smooth. The western types are essentially pubescent species, and the young growth is thicker and softer; and the pubescence is floccose or woolly, and persists upon the under surface of the leaves throughout the season.

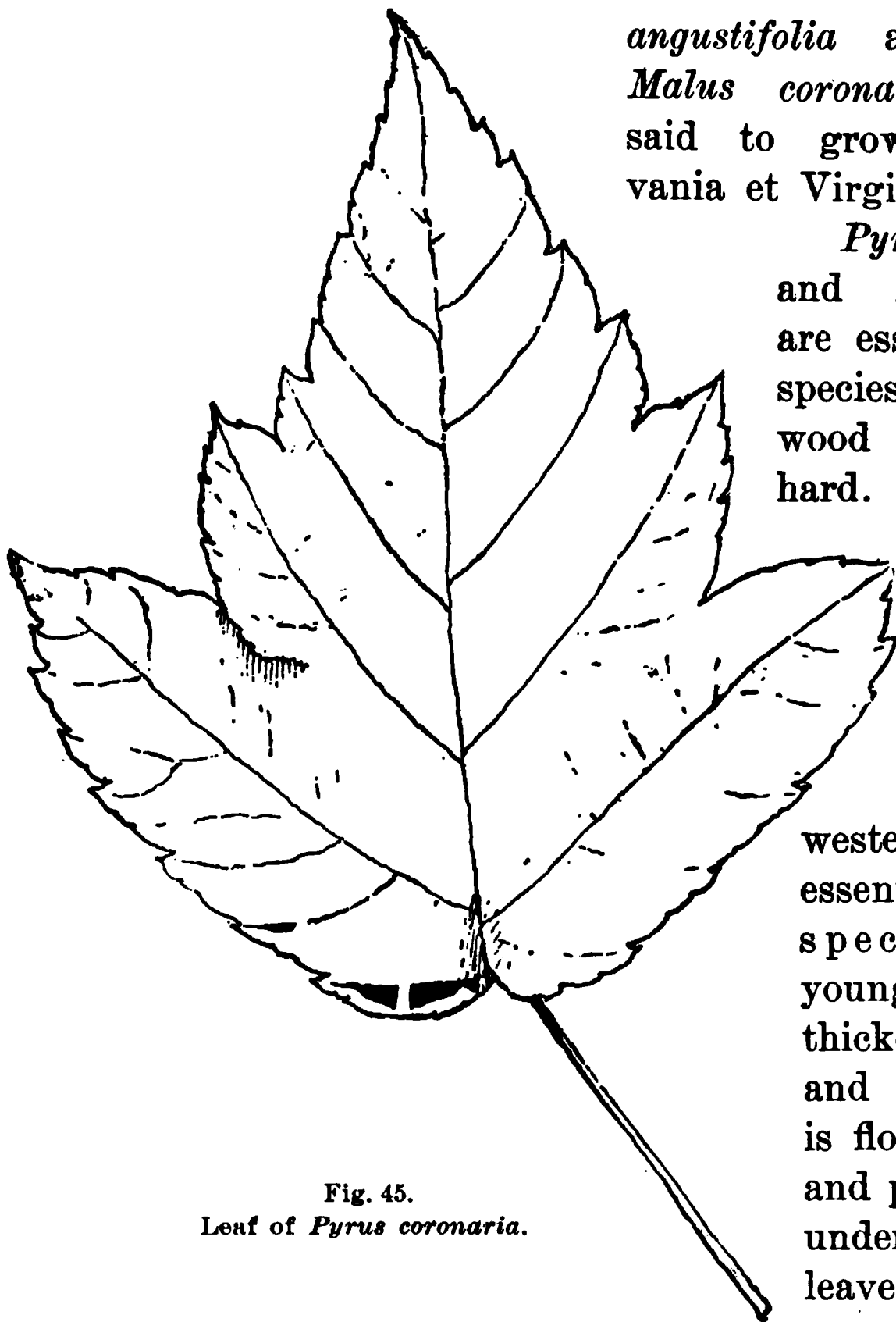


Fig. 45.
Leaf of *Pyrus coronaria*.

3. The prairie states crab (*Pyrus Ioensis*, Bailey, Amer. Gard. xii. 473. *Pyrus coronaria*, var. *Ioensis*, Wood, Cl. Bk. Botany, 333, 1860). Leaves rather

large, firm in texture and white-pubescent beneath, on stout and rather thick, pubescent petioles (1 to 1½ inches long), various in shape: those in the flower-clusters are oblong and blunt and marked above the middle by notches, while the mature leaves range from elliptic-oblong to ovate-oblong, and are irregularly and mostly bluntly-toothed, and bearing a few notches or right-angled lobes or teeth

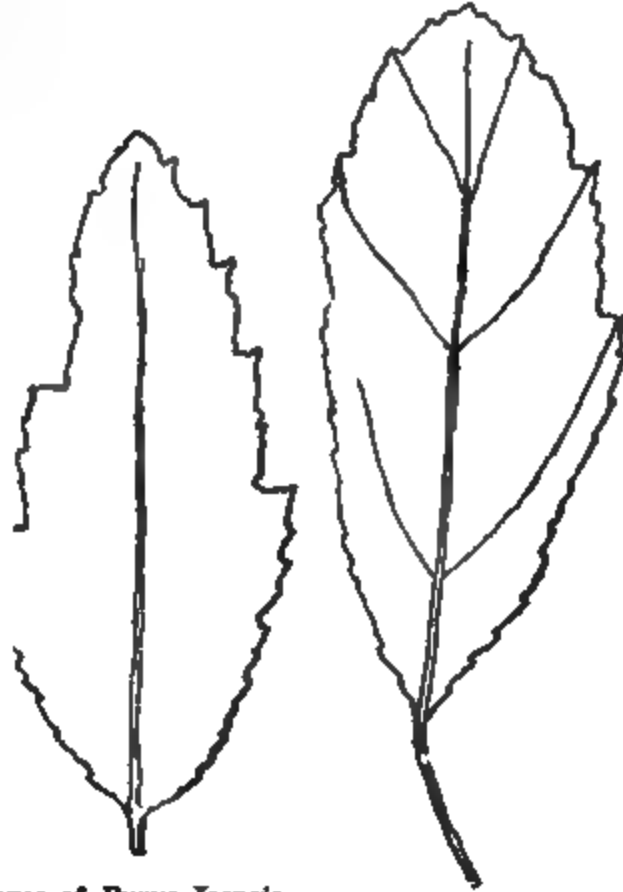


Fig. 46. Leaves of *Pyrus Ioensis*.

(See Fig. 46); flowers nearly or quite as large as in *P. coronaria*, on rather slender but white-pubescent pedicels an inch or so long (Fig. 47). A small tree, growing in Minnesota, Wisconsin, Illinois, Iowa, Missouri and Kansas. The fruit is characteristically different from that of *Pyrus coronaria*, and these differences are well shown in the accompanying illustrations. The fruits of this species (Fig. 48) are oblong, dull, rather heavy green, with many light-colored dots

in the skin ; stem short and thick as compared with fruits of *P. coronaria*, the cavity mostly oblique or unsymmetrical ; basin variable, narrower and shallower than in the other, with less uniform corrugations, the

Fig. 47. Flower cluster of *Pyrus Ioensis*.

calyx closed and pubescent. The fruit is generally more angular and irregular in shape than that of *P. coronaria*, averaging larger, and often has a greasy feel ; not so handsome as the other.

The only description of this prairie states crab, as

distinct from the eastern crab, which I have ever found, is Wood's characterization of as it *P. coronaria*, var. *Ioensis*, in 1860, as follows: "Lvs. (when young), pedicels and calyx densely tomentous. Lvs. ovate and oblong, distinctly lobed; (fr. not seen). Sent from Iowa by Dr. Cousens." *Pyrus Ioensis* is a variable species. The leaves on young and strong shoots are sometimes triangular-ovate, but the blunt teeth, thick petioles and white tomentum distinguish them from *P. coronaria*, the leaves of which upon similar shoots are very sharp-toothed. The flower-clusters and accompanying foliage, barring the white pubescence, are often much like *P. angustifolia*. It is not improbable that it may be found to simulate *P. coronaria* upon its eastern limits. I am convinced that this prairie states crab is sufficiently distinct from the eastern crab to be held as a valid species. It has a normal range, marked technical botanical features, and a very distinct fruit. Figs. 46-48 are characteristic.

In their native and unmixed state, the fruits of these wild crabs offer little promise to the horticulturist. In newly settled localities they are sometimes gathered for winter use, but they are then used in cookery, although I have known of the fruit of *Pyrus coronaria* being buried until spring, when it becomes fairly edible, when other fruit is not to be had. Cider has also been made from these wild crabs. Sargent says of *Pyrus coronaria*: "The fruit is used for preserves, and is often manufactured into cider;" and the same remark is made of *P. angustifolia*. Humphrey Marshall, over a hundred years ago, speaks of the fruit of *Pyrus coronaria* as "small, hard, roundish, umbilicated, and extremely acid. It is frequently

Fig. 49. Prairie states crab. *Pyrus Ioensis*.

used for conserves, &c." But if the native crabs lack in attractive qualities of fruit, they make good the deficiency in beauty and fragrance of flowers. They are amongst the choicest of native small trees for ornamental planting. There is also a double-flowered form (probably of *Pyrus Ioensis*), introduced to the trade in 1893 as "Bechtel's Double-flowering Crab."

Amelioration Has Begun

If the forms or types of native crabs ended here, the matter would be simple enough; but there are certain large-fruited kinds which have been picked up in the Mississippi valley and introduced into cultivation, and three or four of them have received trade names. We must now make an effort to understand their botanical features and histories. The most important of these crabs, which have been found in the wild, is the Soulard (Figs. 49, 50). This Soulard crab has been much talked about, and yet there appears to be little definite information concerning it, particularly in reference to its botanical characters. The fruit was named for Hon. James G. Soulard, of Galena, Illinois, who introduced it. The following account of its origin was given before the Horticultural Society of Northern Illinois by Mr. Soulard in 1869; and the same facts are also given by him in "Gardener's Monthly," x. 199 (July, 1868):

"At the request of the Horticultural Society of Jo Daviess county, Ill., I proceed to give a statement of this remarkable hybrid. It originated on a farm about twelve miles from St. Louis, Mo., where stood an American crab thicket not enclosed, near the farm

house, about 25 years since. The thicket was cut down and the ground cultivated some two or three years; culture being discontinued, another crab thicket sprang up, and when bearing, one tree (the

identical kind now called Soulard crab) was discovered. The fruit astonished me by its remarkably large size, being sent to me by a friend whose widowed mother, Mrs. Freeman Delauriere, occupied the farm. I immediately propagated by grafting upon crab stock and upon our common seedlings. Upon

both stocks producing the same fruit and thriving admirably, I disseminated it among my friends as a very desirable fruit, having nothing of the Siberian type. It is to me conclusive that this crab is the offspring of an accidental hybridization of the wild crab by our common apple. The tree, its foliage, habit, increased size of fruit and tree, and decreased acidity, convince me it is a hybrid, and as far as I know, the first instance of such cross.

"I consider it the most desirable of all crabs that I have seen. Adding sweetness, it is delicious baked. It makes most excellent preserves, being large enough to be quartered, and unsurpassed by any crab for jams, jellies, etc., imparting its delicate taste and rich crab aroma. The largest have measured over seven inches around. In form, color and smell it is like the common crab, and it hangs on the tree until destroyed by frost. It will keep two years, with common care, in a cellar, and will stand repeated freezing and thawing in a dark place. It is agreeable to many palates in the spring.

"The tree is an immense grower in the nursery, coming early into fruit and making but little growth afterwards, and is an immense and regular bearer. I have made some cider as clear as wine, with sugar or a quarter part of sweet apples. It will make delicious strong cider. Tree perfectly hardy, having stood the severest winters here and at St. Paul, Minn., for 25 years. I have none for sale, and never expect to dispose of any; I am too old. But I believe that there is money in it for younger ones."

Downing, in the first Appendix to his "Fruits and Fruit Trees," says that the Souldard crab originated

with Antoine Lessieur, Portage des Sioux, a few miles above St. Louis, Missouri. Confusion appears to have arisen from the fact that a seedling apple raised at Galena by Mr. Soulard has been distributed as the Soulard *apple*. And some writers have said that the Soulard *apple* came from St. Louis, and the Soulard *crab* from Galena. Downing was confused on these fruits, and other writers have added to the perplexity. In "American Gardening" for April, 1893, a correct description and figure of the Soulard *apple* are given, but the confusion respecting the origin is still perpetuated.

There is a great difference of opinion concerning the value of the Soulard crab, due in large part to a misconception of its merits. It must be remembered that it is a crab apple, and is not to be compared with eating apples. As a crab, it appears to possess some advantages, particularly as a possible parent of a new race of fruits for the West. Professor Budd speaks of it as follows, in "Rural Life:" "The only value of the Soulard crab known to the writer is for mixing sparingly with good cooking apples for sauce, to which it imparts a marked quince flavor, which most persons like. It is also said to make a jelly superior to that of the Siberian crabs." D. B. Wier, for many years a fruit-grower in Illinois, writes me as follows concerning it: "It is simply a variety of the common wild crab of the northern United States. Its fruit is quite large for the type, smooth, round, somewhat elongated, and of a clear, bright, golden yellow when ripe; and it keeps with little loss, with care, until spring, when it becomes, we may say, nearly eatable. The fruit, like the type generally, is

very fragrant, and, cooked with plenty of sugar, it makes a most delicious preserve or sweet-meat, highly prized by the pioneer housewife. The tree is a fine pyramidal grower, rather ornamental in form, leaf and flower. It is propagated by root-grafting on seedlings of the common apple. With me in Illinois it was not fully hardy, our severe test winters reducing its vitality plainly. I could not recommend the Soulard crab as being a fruit of much value. With me it was for many years a scanty bearer. It is a rather fine ornamental tree, and did not have the suckering habit, which would make most of the varieties of the species nuisances in the garden." J. S. Harris, of La Crescent, Minn., gives me these notes of it: "The Soulard crab was introduced here about thirty years since, as being a cross between *Pyrus coronaria* and the common apple; as hardy, fruitful and a good substitute for the quince, which it is supposed will not grow here. At one time it was planted quite freely, with the view of making cider from the fruit, but I think it has never proved satisfactory. The fruit is used to some extent in our western cities as a substitute for the quince for preserves, and mixing with better fruit, to which it imparts its aroma; but it has never had a 'boom,' and hence the demand for the fruit is limited and its commercial value not great. It is no better than the wild crab as a stock upon which to work the apple. There is no reliable evidence that it is a hybrid, and I believe it to be a natural variation." The "Farmer's Union," of Minneapolis, published the following statement in 1873, in reply to a remark made in the "Gardeners' Monthly:" "The Soulard grows at Pembina,

more than three hundred miles north of St. Paul. The Soulard of all other crabs is the most valuable. It cannot be used as an eating apple. It is bitter, worse than a quince, but for preserves it is quite equal if not superior to the quince. We consider it to-day the most valuable fruit grown in the Northwest." It is probable that too much was expected of the Soulard crab when it was first introduced, and that it afterwards suffered from the partial collapse. Such an array of apples has now been introduced into the cold Northwest—from the East, from Russia, offspring of the Siberian crab, and local seedlings of the common apple—that the Soulard crab and its kin have been obscured.

What is the botanical history of this Soulard crab? So far as I know, this crab has always been regarded as *Pyrus coronaria*, or as a hybrid between it and the common apple. Any one familiar with *Pyrus coronaria* as it grows in the eastern states will at once observe that the leaves and short petioles and peduncle of the Soulard crab belong to some other species. In my first critical study of the Soulard crab, I became convinced that it represents a distinct natural species, and accordingly named it *Pyrus Soulardi* ("American Garden," xii. 472), and this conclusion was fortified by the fact that the plant occurs in a wild state from Minnesota, apparently, to Texas. The technical characters which I found to separate this plant from both *Pyrus coronaria* and *P. Ioensis* are the following:

"Leaves round-ovate to elliptic-ovate, either rounded or tapering at the base, large, bluntly and closely serrate or dentate-serrate when young, irregularly crenate-dentate at maturity, with a tendency to

become lobed, obtuse or even truncate at the top, on short (1 inch or less) and thick pubescent petioles, very thick and conspicuously rugose, and clothed below with a dense tomentum like the ordinary apple leaf, which it much resembles in color and texture (Fig. 50); flowers smaller than in *P. coronaria*, crowded in close clusters like those of the common apple, and borne on short ($\frac{1}{2}$ to $\frac{3}{4}$ inch long), densely white-woolly pedicels. A rather upright and stout-growing tree, occurring from Minnesota (Lake Calhoun, *Hb. H. Mann.*) to Texas (Gillespie county, *G. Jermey*). Judging from the few specimens in herbaria, this must be an uncommon species. In fact, I have seen but three wild specimens, as follows: Lake Calhoun, Minn., *Hb. Mann.* (Cornell University); St. Louis, Mo., *Hb. Torrey*, and Texas, *Hb. Dept. Agr.* I have the cultivated plant from several sources.

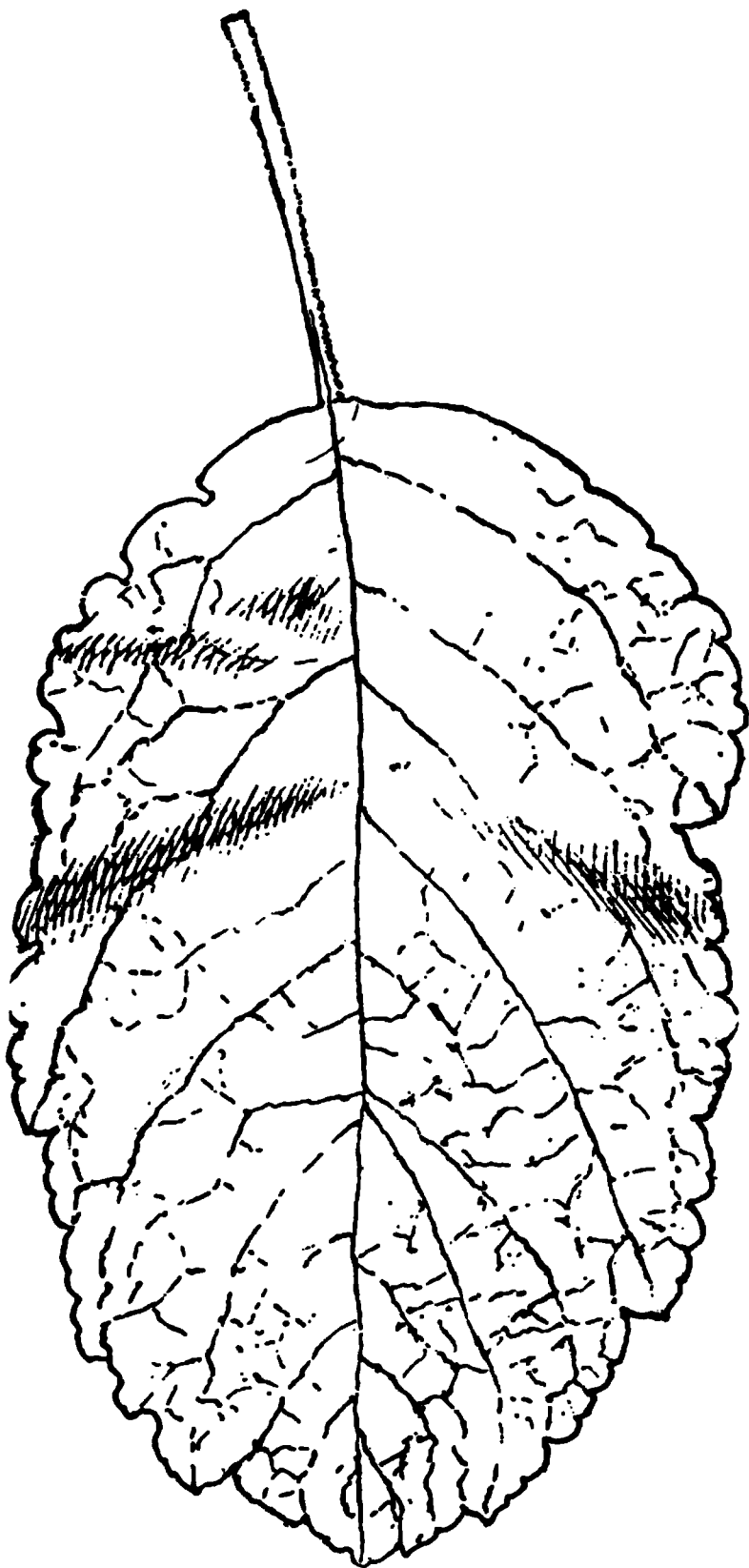


Fig. 50. Mature leaf of Soulard crab.

"Whatever value my conclusions may ultimately be

found to possess," I said at the time, "I hope that the arrangement now proposed will serve to elucidate the confused knowledge of our wild crab apples." With

this saving clause in mind, I now confess to a belief that *Pyrus Soulardi* is not a true species, but is a hybrid between *Pyrus Ioensis* and the common apple, *Pyrus Malus*. The chief considerations which lead me

to this conclusion are the facts that the plant, in a wild state, seems to have no connected or normal range, and that various specimens which I have had an opportunity to examine during the past few years have shown almost complete gradations from one of these species to the other. I cannot now define *Pyrus Soulardi* by any characters which are not also common to one or both of the other species, *Pyrus Ioensis* or *P. Malus*. The reader can trace the features of these assumed parents in the various pictures of them and of the

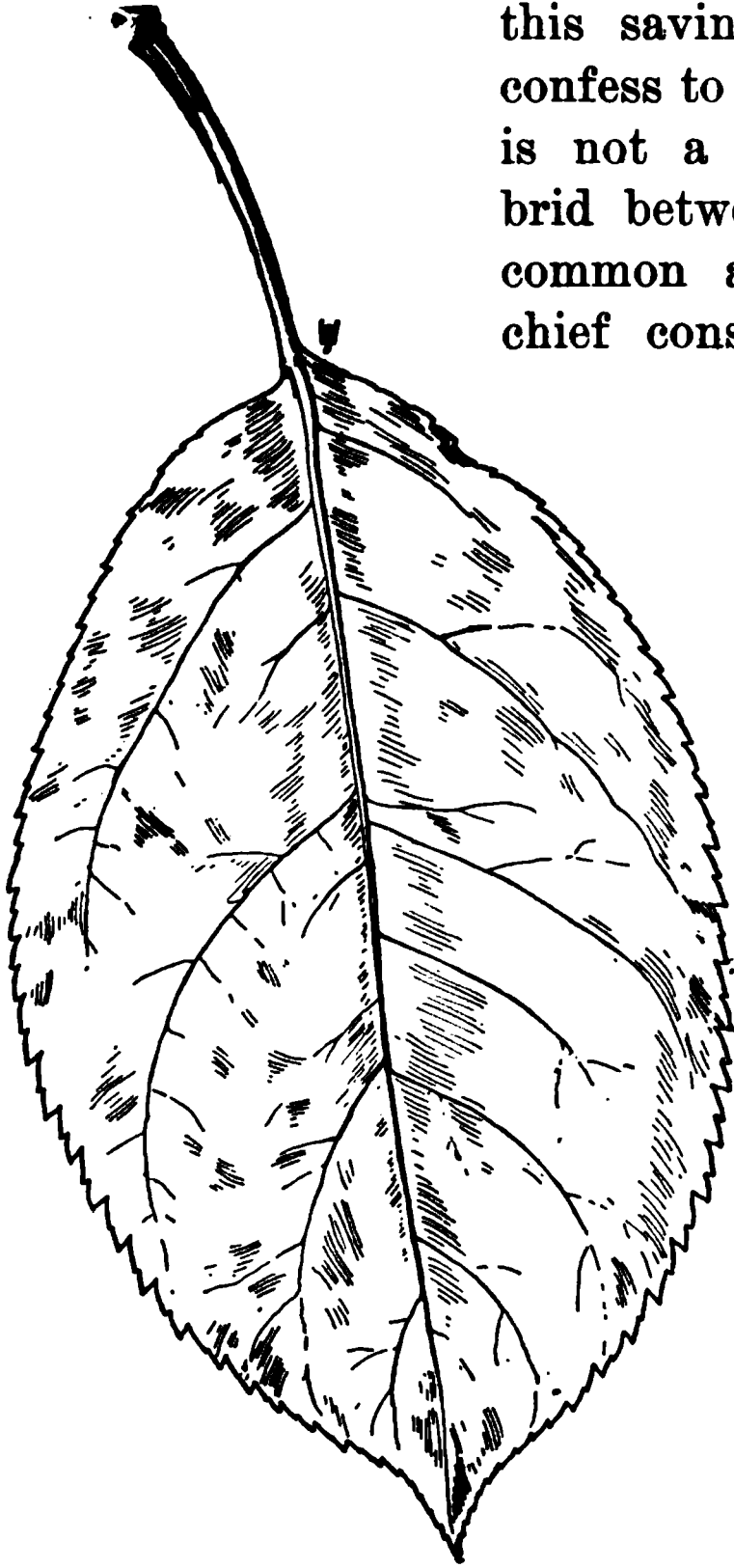


Fig. 51. Leaf of common apple.

Soulard type which accompany this text. Fig. 46 shows outlines of the leaf of *Pyrus Ioensis*, and Fig. 51 of the common apple. Fig. 50 is a good intermediate.

Fig. 52. The Mathews crab. *Pyrus Souldardi*. Natural size.

Forms of large-fruited crabs are now frequently discovered in the thickets of the West. The photographs of the Mathews crabs, shown full size in Figs.

52 and 53 will give an idea of the type of some of these wild crab specimens were sent to Mr. Mathews, of Knoxville, Tenn., for cultivating it. It has very large, apple-like, smooth leaves. Mr. Mathews writes that trees of this which he has in cultivation gave fruit, in the fall of 1890, which "sold at one dollar per bushel, while good fruit of Grimes' Golden, Roman Stem and others was selling for fifty to seventy-five cents." Mr. Mathews adds: "I saw specimens of another wild crab last fall which reminded me of small Grimes' Golden. It was the nicest one I have seen." J. S. Harris, Minnesota, writes, "I saw a sample of native crab last fall that was larger than the Soulard, and quite distinct from it."

The late D. B. Verrill, of Illinois, once wrote me as follows respecting wild crabs: "Along the streams in northern Illinois I have seen many wild crabs the superior of the Soulard in every characteristic, yet none with qualities such as would give them much value for cultivation, though many might be useful as culinary

fruits. If the quince is a valuable culinary fruit, the better varieties of the wild American crab are worthy a place in the garden and orchard for the same purposes. The crab is much the hardier, handsomer tree, and subject to much fewer ills than the quince, and is usually enormously productive of its peculiar austere fruit. The wild crab ripens its fruit from early autumn until the following summer. The old practice in pioneer times was to bury the hard fruit in the soil late in autumn and so leave it until spring, when it would open out a fine golden yellow.

"In its wild state, this crab is a variable fruit in size, color, flavor, shape and time of ripening. I have seen trees of it growing wild, with fruits averaging fully two inches in diameter. The fruit of the Soulard runs from one and a-half to two inches. The fruit of it is generally round, somewhat flattened, averaging about an inch in diameter, though often larger or smaller. It is rarely oblong, sometimes pyriform, and I have seen it (or one of the same type) in one instance with the fruit pyriform, and with a bright red cheek, growing in the woods miles away from domesticated apples; and I have heard of two other like instances. The better varieties of our wild crab should be a fruit of value in the far north, above the line where the common apple can be safely grown. And there is no doubt, from its natural variability, that a fruit of considerable value could be produced from it for culinary purposes. The pioneers had little use for it, simply because sugar in those days cost money, and money at times was not to be had."

The Fluke crab is another of these hybrids, from Iowa, with fruits as large as those of the Mathews.

It is strange that hybrids of the common apple and *Pyrus coronaria* have never been found, although both species are common in the eastern states. But the fact that the apple seems to hybridize freely with *Pyrus Ioensis* and not with *P. coronaria*, is still further indication that these two native crabs are really distinct species, as species go. To my mind, there is much promise of good to come from the further amalgamation of *Pyrus Ioensis* and the common apple, particularly in the augmentation of hardiness of tree and keeping qualities of the fruit. There is warrant for this opinion in the old-time crabs of our gardens, of the Transcendent type, for these are hybrids of the common apple and the Siberian crab, *Pyrus baccata*. So distinct in appearance are some of these apples that Willdenow long ago called them a distinct species, *Pyrus prunifolia*.* There are many crabs in cultivation which belong to this prunifolia class, and they are prized for culinary qualities, beauty, productiveness and hardiness. *Pyrus prunifolia* is to the apple and the Siberian crab what *Pyrus Soulardi* is to the common apple and the prairie states crab; and if the former type is valuable we have reason to hope that the latter will be also. Various experiments have already been made in hybridizing this western crab with the apple, by C. G. Patten, of Iowa, by experimenters at the Iowa Agricultural College, and elsewhere; but it is probable that the larger part of the future improvement will be fortuitous, for nature makes her experiments upon an extensive scale, and she never gives up. The years

*Willdenow's type of *P. prunifolia*, preserved in Berlin, shows flowers and leaves, and has the botanical characters of the Transcendent and Hyslop crabs. It is almost unmistakably a hybrid of *Pyrus Malus* and *P. baccata*.

are hers. The insinuation of the native blood into domestic apples will probably be very gradual and undemonstrative, and much of the result will probably never be discovered; but the benefits will be all the greater if the native species shall be so completely blended with other types that their influence is not recognized.

V

THE ORIGIN OF AMERICAN RASPBERRY-GROWING

THE raspberry has long been one of the important bush-fruits of Europe. The wild plant is native to Europe, and it was named *Rubus Idæus* by Linnæus, from Mt. Ida, in Greece, where it seems to have been early esteemed. This raspberry has been cultivated from the fourth century of our era, and perhaps even earlier, although its cultivation had not attracted much attention until two or three centuries ago. About twenty named varieties were known in England early in this century.

This excellent European fruit was early introduced into American gardens. M'Mahon recommends it in his admirable "American Gardener's Calendar," in 1806. "There are many varieties of the *Rubus Idæus*, or European raspberry," he writes, "but the most preferable are the large common red, the large common white, the red Antwerp, and the white Antwerp raspberries." The first edition of Prince's "Pomological Manual," 1831, describes a dozen varieties, the greater number of which are of foreign origin. It was soon found, however, that this European type of raspberry is unreliable in North America. This is chiefly because of lack of hardiness, both in withstanding the cold of winter and the drought and heat of summer. Consequently, the raspberry failed to attract much attention

except in garden cultivation, where some protection and the best care could be given it. The Antwerp and the Fontenay, varieties of this species, are still grown by amateurs.

Early American History

But, as in the grapes, plums, gooseberries, and other fruits, there are raspberries growing in the woods which quickly lent themselves to domestication as soon as an effort was made to tame them. In fact, they came into cultivation without an invitation, and so little have we cared for their genealogies that it is not until the last six or eight years that any real attempt has been made to discover the botanical affinities of the various types. The first native berry to come into cultivation was called the English Red, the name itself recording the ignorance of its origin. In 1831, when Prince wrote, this was "the only variety at present cultivated to a great extent for the supply of the New York market, and there are probably near one hundred acres of land on Long Island appropriated to its culture." Prince was aware of its botanical affinities, and he substitutes for the name English Red the truer one of Common Red, and gives it *Rubus Americanus* for its Latin name. He says that it "is a native of our state, and grows naturally in the Catskill Mountains." "The fruit is one of the earliest at maturity, of medium size, fine flavour, and held in great estimation, as well for the dessert as for making cherry brandy, &c." Prince also mentions the Virginia Red, which appears not to have been in cultivation; the Pennsylvanian, a red-fruited

variety which he obtained "from a London nursery, under the title of *Rubus Pennsylvanicus*, but have since found it to be identical with plants received from the forests of the State of Maine;" and the Canada Red, or *Rubus Canadensis*, a red raspberry of medium size which he had seen growing along the roadsides near Montreal, and the fruit of which was there collected and "large quantities sold in the markets." Prince also mentions the wild black raspberry, but this was not cultivated. The preference for the red berries is easily explained from the fact that the fruits of the European raspberry are red or purple. The earliest raspberry-growers naturally followed the foreign models; but these patterns were destined soon to be obscured by a new type of fruit.

We shall find this new type of fruit—the improved black raspberry or black-cap—developing in the West, and its genius is Nicholas Longworth, the same prophetic spirit who put American grape-growing on its feet. He had found a wild raspberry of unusual promise in Ohio in 1832. After he had cultivated it for a number of years, he was not only convinced of its value for America, but wanted it tried in England as well. So we find him writing to the "Gardener's Magazine," in London, about his new berry:*

"When driven into the interior of the state by the cholera, in September and October of 1832, I found a raspberry in full bearing, a native of our state, and the only everbearing raspberry I have ever met with. I introduced it the same winter into my garden, and it is now cultivated by me in preference to all others,

* A synopsis of this history is published in Bull. 117, Cornell Exp. Sta.

and my table is supplied from the beginning of June till frost.

"By means of heat, under glass, it might be made to bear well through the winter. The first of June it produces a most abundant crop, about ten days earlier than any other variety. The wood producing that crop dies through the early part of the summer, and the second shoots begin to ripen fruit before the crop on the old wood is over, and continue to bear till frost, and then produce the June crop of the following season. The fruit is black, of good size, and is preferred by a majority of persons at my table to the Antwerp. The vine is a native of the northern part of our state, where the summers are not as dry and warm as at our city, and they have a substratum of clay. In my garden the substratum is gravel, and our summers are dry and hot. From these causes it does not bear as well with me through the heat of the summer as it does in its native region, and will do in a cooler and moister climate. I sent some to my sister, nine miles from New York, where the substratum is clay, and the climate cooler and less subject to drought. With her it produces double the fruit in the heat of summer that it does with me. From these causes I have believed it would bear most abundantly in most parts of Great Britain. It does not increase by offsets, as other raspberries do, but in September and October the shoots descend to the ground, and each one, as it strikes the earth, throws out six or seven small shoots, that immediately take root and throw up shoots. I say it is a native, because I have never seen or heard of it except the few plants in a particular location where I found it in 1832. It has

not yet been offered for sale, except a few plants by Mr. Howarth, who now contemplates taking his entire stock to England. It is unknown out of this vicinity, and there is but one person who has more than a few plants, as there have been none for sale. Our seasons have been dry of late years, and, anxious to supply my own garden, I could spare none, except a plant to a particular friend. All beyond what are wanted in my garden, my gardener furnished to Mr. Howarth. The vine is very hardy, is not killed by frost, is of rapid and vigorous growth, and requires no particular cultivation, except that, from its vigorous growth, it should have a higher trellis than the Antwerp. * * * * *

"CINCINNATI, OHIO, September 30, 1841."

Attached to this letter is a memorandum from J. B. Purcell, Bishop of Cincinnati, testifying to the goodness of both Mr. Longworth and the fruit: "I feel happy in expressing my perfect assent to what has been stated above, on which the most perfect reliance can be placed," the reverend gentleman says. "Mr. Longworth has no interest but the public good and the advancement of horticulture to promote, by his bringing before the people of England this luxurious, hardy, and indigenous variety of the raspberry. As far as my judgment goes, I have never tasted a finer species of that fruit." The editor of the magazine adds that "plants of this raspberry are in a London nursery, but none of them will be sold till the worth of the variety is ascertained." The variety never gained much note in England, but Robert Hogg still retains it in the fifth edition of his "Fruit Manual," in 1884,

although it is probably long since extinct in America.

Longworth's letter to the "Gardener's Magazine" is not the earliest record of this raspberry, however. The earliest note of it which I have seen is the following, in Hovey's "Magazine of Horticulture," Boston, for 1837:

"*Everbearing Raspberry*.—The 'Genesee Farmer' states that a new kind of raspberry has been found in New York state, near Lake Erie, by the Shakers residing there, and that it produces its fruit throughout the summer and autumn. It is also stated to be really a valuable variety, and worthy of extensive cultivation. The fruit in appearance is longer than the wild black raspberry, and approaches near, in size and excellence, to the White Antwerp, but is not so high flavored. The habit of growth is somewhat similar to the common purple raspberry, the shoots of which are very vigorous, bending over and touching the ground, and take root, by which mode it is rapidly increased. Its mode of producing its fruit is as follows: In the spring the old shoots throw out their new branches, as in other sorts upon which the first crop appears, but soon the new shoots begin to grow, and when they have attained a good size, which is generally just before the first crop is gone, they produce the second crop; to this latter circumstance it owes its name, and its peculiarity. The fruit of the second crop is considered the best. It is grown by Mr. Longworth, of Cincinnati, and by the Shakers near Lebanon, but has not yet found its way into any of our Atlantic cities."

In 1842, the same magazine makes another account of this variety:

"*The Everbearing Raspberry*.—In our Vol. III., p. 154, under our Miscellaneous Notices, we gave an account [quoted above] of this fruit, which had then just been brought into notice; since then, we have heard very little of it till the past year. It is now attracting more attention, and as it is deemed a valuable acquisition, we have copied a further description of it below, which we find in the 'American Agriculturist:'

"The Ohio everbearing raspberry was first discovered some fifteen years ago, in the northern part of the state, near Lake Erie, but in what particular part is unknown. Mr. Longworth, of Cincinnati, introduced it into his garden in 1832, at which period he was driven into the back country by the cholera, where he found it growing. It has been little known, however, in Cincinnati, until within the last two years, but there is now great effort made by the gardeners to cultivate it for the market of that city. The fruit resembles the wild native raspberry, but is much larger, more fleshy, and of a much finer flavor, and is almost a very profuse bearer. In Cincinnati, the wood of the previous year bears one crop in June, after which it soon dies; the young shoots then come into bearing, and continue doing so into October, till the frost cuts them off, when may be seen buds and blossoms, and the fruit in every stage from green up to full ripe, on the bush, stayed by the hand of nature in the midst of their productiveness. The fruit is preferred by many to the Red Antwerp, and with its large, erect clusters of flowers, presents a beautiful appearance.

"Mr. Longworth, in a communication describing

this fruit, in the 'Gardener's Magazine' [already quoted], states that the plants, in light, dry soils, are not very productive in the autumn crop; but if grown on a stiff loam on a clayey subsoil, bear profusely till destroyed by frost. From all that has been said in relation to it, it appears a desirable fruit, and we hope soon to test its qualities ourselves."

From these two last accounts, one is not sure whether the variety was found in New York or Ohio, notwithstanding the explicit statement [p. 279] that it came from New York state, for it is stated that it had not yet found its way into the Atlantic states, but was grown only by Longworth and by the Shakers at Lebanon, which is about thirty miles from Cincinnati; and, moreover, it could not have occurred in the "northern part of the state" of New York and yet be found "near Lake Erie." Longworth's own account explicitly states that he found the berry in Ohio.

The berry became known as the Ohio Everbearing, and, by the natural process of elimination, as the Ohio. At the present time, an Ohio raspberry is extensively cultivated, so extensively that in western New York alone probably not less than a thousand tons of the dried berries are marketed each year from this single variety. But this contemporaneous variety is not the berry of Longworth. It originated from a single plant which came in a planting of another variety, obtained from Ohio, early in the sixties, upon the farm of Hiram Van Dusen, of Palmyra, New York. The old Ohio has passed away, but berry-growers have not known the fact, because the present variety, of like name, has been confounded with it. The materials which are concerned in the evolution

of horticulture are so transient, and the records and histories are so few and so inaccurate, that many of the milestones are lost forever; but this generation should do something to rescue and to hold the passing events upon which so much of the knowledge and experience of the future must rest.

The next event in the domestication of the native black-cap was the introduction of a variety found growing wild by Leander Joslyn, of Phelps, Ontario county, N. Y., and introduced by H. H. Doolittle, of Oaks Corners, in the same county, about 1850. This was variously known as American Black, Joslyn's Black-cap, Joslyn's Improved, American Improved, and Doolittle. Under the last name, the variety was widely disseminated, and was cultivated until ten or fifteen years ago. Several other varieties followed within the next few years, but raspberry culture grew slowly, nevertheless. The American Pomological Society, at its session in 1853, commended only five varieties, and all of them were foreigners. The growing of small-fruits had not yet assumed great importance in this country. There were no facilities for marketing such fruits in any quantity, people had not learned to use them freely, and the farmers were wedded to the old-time crops. It was not until after 1870 or 1875 that, under the stimulus of a general awakening and new teaching in agricultural matters, the cultivation of the bush-fruits began to attract widespread attention. Meantime, however, the foundations were all laying. Forehanded persons here and there were learning how to grow and handle the new fruits. Books and periodical articles, some of them in advance of their time, were expounding the new ideas. Now

and then a patient investigator was working out new problems and securing new varieties. The bud of a new type of agriculture was slowly developing. We now foresee the full bloom.*

Among the earliest American experimenters with raspberries was Dr. William D. Brincklé, of Philadelphia, "a busy physician, who," as Professor Card writes, "having a taste for pomology, pursued it as a means of recreation from other duties. He experimented with strawberries and pears, as well as with raspberries. So important was his work in these lines that he seems to be much better remembered for that than for his medical reputation, although he was successful and prominent in this field also. He was president of the American Pomological Society at its second session, and for many years vice-president of the Pennsylvania Horticultural Society, repeatedly refusing its presidency. Unfortunately, his work on raspberries was with the *Rubus Idæus* species, and most of the varieties which he produced have suffered the fate of the class to which they belong; yet he obtained in Brincklé's Orange the variety which has stood as the desideratum to be sought in quality to the present day." This variety has the following history, to quote Dr. Brincklé himself: "It originated * * * * * from a seed of Dyark's Seedling, a large English crimson variety, imported by Mr. Robert Buist, of Philadelphia. The seed was planted July 13th, 1843, vegetated in the spring of 1844, fruited in 1845, and described in the 'Horticulturist'

*For a very full description of all the varieties of raspberries cultivated in the United States, see Crozier, Bull. 111, Mich. Exp. Sta. Consult, also, Card's "Bush-Fruits."

for October, 1846." Dr. Brincklé died in 1863. He was born in Delaware, and he began his medical career in 1820 in Wilmington. In 1825, he removed to Philadelphia. A correspondent signing himself "R. B." (whom I take to be Robert Buist, the dis-

Fig. 54. William D. Brincklé, an early experimenter with the raspberry.

tinguished seedsman and author, of Philadelphia), writing to the "Gardener's Monthly" upon the occasion of Brincklé's death, remarks that "Dr. Brincklé stood at the very head of the pomological fraternity, and had done more for the science than any other person, whether American or European." Another correspondent, "J. J. S." (no doubt John Jay Smith, editor of Michaux's "Sylva," and once editor of the "Horticulturist"), gives the following reminiscence of Brincklé:

"Soon after the establishment of the 'Horticulturist' I introduced my much lamented friend Downing to Dr. Brincklé, at the time residing in Girard Row, Chestnut street, then the most distinguished range of houses in Philadelphia. His dwelling was capacious and fashionable, but its attraction to Downing was a garden about as large as the parlor, and a fourth-story front room looking south; in the former was contained a few raspberry bushes, on which the Doctor was experimenting; and there stood the Brincklé Orange, then bearing, for the first time, half a dozen of its golden berries; others were about, but the Orange was evidently his pet, and it did not deceive his hopes. That fruit alone is a passport to enduring fame; an acquisition in every sense to be proud of.

"The up-stairs front room floor was covered with pots of strawberries, on which hybridizing experiments were in progress, and the Doctor told us, with evident satisfaction, that he could pick a bowl of fruit for a patient at all seasons. Much conversation ensued between the two lovers of improvement, and when we left, Downing said much what your correspondent has written [page 284], that Brincklé had done more for horticulture than any other person in America. If I am not mistaken, he thought more than all the rest of us put together.

"Dr. Brincklé was eminently a genial man, and loved to have his friends around him. He gave, on one occasion, of a fruit-growers' exhibition, the most superb fruit party ever seen in this country. All the gardeners and amateurs vied with each other to fill his noble table with their best fruits; these, combined with the very *recherché* cookery of Philadelphia's best

restaurateurs, and the best American and foreign wines, with the addition of the élité of our citizens and the gardeners, formed a scene such as I have witnessed in no country. The occasion proved a most interesting one, serving not only to make people better acquainted with each other, but to promote the cause of fruit progress.

"On one occasion a pleasant ruse was tried upon the palates of some of our best judges of wine. Longworth's champagne was then a new and unknown product, and a supply had been forwarded to the Doctor. I was requested to change the labels from some very superior foreign champagne to Longworth's bottles, and to replace his on the European. Then came the trial! The supposed foreign was condemned and Longworth's had the preference from some of the most noted Cognescenti. The triumph was complete, and was long a standing subject of hilarity and joke.

"Little in the way of labored panegyric need be said of our lamented friend. His own merits are established, 'and his deeds do follow him.'"

The Present Types of Cultivated Raspberries

With the exception of the English Red, there appears to have been no native red raspberry in cultivation until nearly or quite 1860, when Allen's Red Prolific and Allen's Antwerp—varieties sent out by L. F. Allen, Black Rock, N. Y., and which, according to A. S. Fuller, were "merely accidental varieties of the wild red raspberry of his locality"—were introduced to the public; and it was many years after this that the true red raspberries began to attract much

attention from berry-growers. The old English Red appears not to have been a true red raspberry, but to be a representative of a distinct class, which later came to be called the Purple Cane. When Fuller wrote his most excellent "Small-Fruit Culturist," in 1867, there were four types of raspberries in cultivation: the black-caps, represented by the American Improved or Doolittle, Dawson's Thornless, Elsie, Miami, Ohio Everbearing, Seneca, Summit Yellow-cap, Surprise, White-cap and Woodside; the red raspberries, comprising Allen's Red Prolific, Allen's Antwerp, Kirtland, Pearl, Stoever and Scarlet; the purple-canes, with Catawissa, Ellisdale, Gardiner, Purple Cane and Philadelphia; the foreign or *Idæus* types, of which he mentions sixty-seven varieties, but which, as a class, although "larger and better flavored than those of our native species," present few varieties "that are hardy in the northern states, and their leaves burn more or less at the South." The black raspberries are direct offspring of the wild black-cap or thimbleberry, *Rubus occidentalis*, which is common everywhere in the northeastern states. It is the first pure native species to give domestic offspring, and it is now the most widely and extensively cultivated of any American raspberry. The true red raspberries are direct offspring of the wild red or scarlet berry, *Rubus strigosus*, which is the American representative of *Rubus Idæus*, and by some botanists held to be only a geographical modification of the latter. It has a wide natural range, extending farther north than the black-cap. The foreign varieties are direct offshoots of *Rubus Idæus*, which grows wild from Norway and Siberia to Spain and Greece.

But what is the purple-cane tribe, of which the

English Red was the prototype? This was called *Rubus Americanus* by Prince in 1831, and his *Rubus Pennsylvanicus* is likely the same type. A. S. Fuller appears to have been the first author to separate this class of garden berries. He calls them the "purple-canes," and characterizes them as follows: "The principal difference between the varieties of the black-cap and purple-cane is in the fruit. The first, as is well known, has a rather dry, tough fruit, with a peculiar flavor. Its grains are numerous and very irregular in size. The fruit of purple-cane, as a rule, is rather soft, juicy, often very brittle, the grains separating very readily; color varying from light red to dark brownish purple, but never black; the flavor mild and agreeable, but entirely distinct from those of the true black raspberry." I think that some of the sorts which have been referred to *Rubus Idæus* belong to this type, and also the Doolittle's Red-flavored Black, which Mr. Fuller refers to the true black-caps. I am convinced that it is the most important type of raspberry known for America. From pure red raspberries, or *Rubus strigosus*, we appear to have obtained fewer varieties than is commonly supposed; Cuthbert appears to me to be the first decided advance in that species.

In 1869, Professor C. H. Peck studied certain wild raspberries in New York, and used the name *Rubus neglectus* for what he took to be a distinct natural species. The following year, C. F. Austin, writing of northern Jersey plants, in the "Bulletin of the Torrey Botanical Club," speaks as follows of this raspberry: "*R. neglectus*, Peck, a hybrid, I have no doubt, between *R. strigosus* and *R. occidentalis*, occurs in Orange county, but seldom more than one bush in a place; it

will hardly average a bush to a hundred acres of land." Finally, in 1890, the present writer referred the purple-canés to this *Rubus neglectus* of Peck, and attempted to designate the botanical characters which distinguish the cultivated forms from those of *Rubus occidentalis* and *R. strigosus*. The garden berries which he then referred to this species are Shaffer, Caroline, Gladstone, Philadelphia, Reliance "and probably Crystal White." This *Rubus neglectus* is widely distributed in a wild state. In order to understand it, we must draw the characters of its relatives, the black and the red; and in these features the accompanying pictures of these species will help us.

The botanist may distinguish our four types of cultivated raspberries by the following marks:

Rubus occidentalis, Linnæus (Blackcap, Thimbleberry of some). (Fig. 55.) Stems long, and at maturity recurved and rooting at the tips, conspicuously glaucous, armed with stiff, hooked prickles; inflorescence densely cymose, the peduncles all aggregated or rarely one or two somewhat remote, short and stiff, simple and erect, bearing stiff prickles and sometimes also straight bristles; petals shorter than the sepals; fruit depressed, firm and dense, black. Here belong the Gregg, Ohio, Hilborn, Ada, and others. The close-fruited clusters are well shown in the accompanying photograph (Fig 55), and it will be seen that the condensation is greater in the Gregg than in the wild berry. Amber-fruited forms of the black-cap are occasionally found in wild areas.

From Wyoming westward the wild black-cap raspberry is represented by another species, known as *Rubus leucodermis*. It is doubtful if the plant is really distinct

Fig. 55. The progress of a generation. The wild black-cap and the Gregg, two clusters of each. (\times five-sixths)

from the eastern species, and Card thinks it a variety. Its chief marks are shorter and more hooked prickles, more coarsely toothed leaves, and a yellowish red fruit which has a white bloom. It has been recommended for cultivation for its fruit, but no named varieties have yet appeared. Wickson speaks of it as having "a yellowish red fruit, rather large, with a white bloom, and agreeable flavor." Shinn says that it "occasionally carries a fair crop of fruit, but one may often search a whole acre of thimbleberry bushes in the season without obtaining a double handful."

Rubus neglectus, Peck. (22nd Rep. Regents N. Y. State Univ. 53, 1869.) Habit various, but the stems in typical forms long and rooting from the tip; stems glaucous, usually more or less armed with prickles, often bristly also; inflorescence racemose-cymose, the peduncles short and usually prickly, mostly stiff, the upper ones erect or ascending, simple or nearly so above but unequally branched below, some of them aggregated above; fruit varying from purple-black to bright purple or even yellowish. Among cultivated sorts, the Shaffer (Fig. 56) may be considered the type of the species. A glance at the illustration will show the aggregated character of the fruit cluster at its apex and the gradual tailing out of the cluster at the base. The lowest branches in the cluster are apt to give imperfect fruit. There are all gradations, from the heavy-topped cluster of the Cuthbert to the loose cluster of the Caroline, but the ragged cluster is usually characteristic of *Rubus neglectus*.

Rubus strigosus, Michaux (Red Raspberry). (Fig. 57.) Stems, at least in the wild plant, densely clothed with straight and weak bristles, usually brown or

reddish brown; inflorescence racemose, the peduncles scattered, all slender and drooping, either simple or 2- or 3-flowered, not aggregated at the top, smooth or bristly; petals as long as the glandular sepals; fruit light red, soft. The racemose character of the

Fig. 56. The Shaffer raspberry. *Rubus neglectus*.

inflorescence of this species is well shown in the picture of Cuthbert, a variety which appears to closely represent in all particulars the true *Rubus strigosus*. Hansell also appears to be *R. strigosus*. The wild plant is densely clothed with weak bristles, but these

mostly disappear in cultivation. They sometimes persist near the base of the cane, and traces of them can be seen in the inflorescence. I have a white-fruited raspberry, which is *Rubus strigosus*. The stems are whitish. The leaves also possess a curious dentation,

the teeth being rounded and tipped with a short cusp, but I am not sure that this is a constant character, or that the variety possesses any other distinguishing mark than albinism.

Rubus Idæus, Linnæus (European Raspberry).
Plant usually stiff and erect, usually stronger than

R. strigosus, the stems bearing nearly straight slender prickles or weak bristles, and usually light-colored; inflorescence sub-corymbose—the pedicels short, and aggregated above, where they are erect or ascending; fruit large and broad, appearing more or less continuously throughout the summer, purple or yellowish, firmer than that of *R. strigosus*; calyx glandless. The raspberries belonging to this species are usually tender in the North, as we have seen, and they have not been grown to any extent since the introduction to cultivation of the native species. Here belong the Fontenay, Antwerps, Fastolf, Brincklé's Orange, and their kin.*

These descriptions and figures show that the purple-cane or *Rubus neglectus* class is intermediate between the black-cap and true red raspberries. The type has no characters which are not found in one or both of the other two. Neither has it any normal or continuous range, but occurs where the black and red species are associated. All this points strongly to hybridity; and there is now sufficient accumulation of experimental evidence to prove a hybrid origin for these berries.

* Card, who has given much thought to the raspberries, gives me the following contrasts of the two red-fruited species:

Rubus Idæus.—Plant usually stiff, erect, and light-colored, the main stems bearing nearly straight slender prickles; flowering shoots, petioles, veins, pedicels and calyx finely pubescent, but not glandular, and sparsely beset with firm recurved prickles; leaves thicker than in *R. strigosus*, whitened downy beneath and usually somewhat wrinkled; calyx tomentose; fruit dark red or yellow, produced more or less continuously throughout the season.

R. strigosus.—Stems more slender than *R. Idæus*, beset with stiff, straight prickles, usually brown or reddish brown, somewhat glaucous; flowering shoots, pedicels, calyx and petioles hirsute with glandular-tipped hairs in the wild type, though largely disappearing in cultivation; calyx slightly pubescent or hirsute; fruit light red, rarely yellow, produced less continuously than in *R. Idæus*.

The salient points in our raspberry history, then, are these: The Old World berry was early introduced and widely tested, but it proved to be tender, and is now known in this country only in the gardens of amateurs. The varieties which we now grow are all derived from our native species. The first of these native berries to be domesticated appears to have been a natural hybrid between the wild black and the wild red, and to have come into cultivation about 1825. This hybrid class, which seems to be the most promising type of American berries, was not recognized as distinct until Fuller defined his purple-cane group in 1867; in 1869, Peck founded a new species of rubus on it, calling it *Rubus neglectus*; in 1890 the purple-cane raspberries and *Rubus neglectus* were determined to be of similar type and origin. The first direct effort at improving the native berry was the introduction of a promising wild Ohio berry in 1832 by Nicholas Longworth, and this berry subsequently came to be known as Ohio Everbearing. The chief merit of this first cultivated black-cap, in the eyes of its disseminators, was its habit of bearing a second crop of fruit in the fall, a feature which is by no means uncommon in the black raspberries. This Ohio is probably no longer cultivated, but there is another Ohio raspberry, of later origin, which is widely grown. The general influence of amelioration in enlarging the fruit and condensing the cluster is shown in Fig. 55. The Gregg is a fair example of the improved black-cap, although a recent variety has brought the size of individual berries to an inch in length and three inches in circumference at the base. The domestication of the true wild red raspberry began shortly before 1860. But the red

type which is most productive of good and various forms is the purple-cane group, which we have already discussed.

There is every reason to believe that much greater

Fig. 58. A garden hybrid. Gregg \times Shaffer.

results are possible in the improvement of the American raspberries than have yet been obtained. The European raspberry is still superior in size and quality, but if it has been possible to derive the varied garden

berries of the Old World from a single species, still greater results may be expected from the amelioration of two species which freely hybridize.

Outlying Types

The Salmon-berry of the Pacific coast has come into cultivation within the last very few years as a fruit plant. The best type is *Rubus Nutkanus* var. *velutinus*. Charles Howard Shinn, of the California Experiment Station, writing in "Garden and Forest" in 1894, says that this plant "belongs more distinctly to the northern California coast, where it is highly esteemed, but it does not grow well elsewhere." Wickson, in "California Fruits," says that the variety "thrives best in the upper coast counties, and efforts to introduce it as a commercial fruit generally throughout the state have not proved successful." *Rubus Nutkanus* itself ranges from northern Michigan to Alaska and New Mexico, always being a boreal, subalpine or highland plant. It is closely allied to the common flowering-raspberry, or *Rubus odoratus*, of the East, from which it differs chiefly in having white flowers, a less dense clothing of glandular hairs, less acuminate lobes to the large leaves, and a larger fruit. It bears a large and sweet hemispherical red fruit. This species itself, as well as the variety *velutinus*, is recommended for cultivation. Both are known as Salmon-berries.

VI

EVOLUTION OF BLACKBERRY AND DEWBERRY CULTURE

NORTH AMERICA is the only country which can boast of the cultivation of blackberries and dewberries for their fruits. The hedges of Europe are full of blackberries, and many of the bushes produce excellent fruit, but they are too common and the bushes too vicious and wayward to attract the cultivator. Now and then bushes are transplanted to the gardens, but there appear to be no named varieties. "Nowhere in the three kingdoms," writes Grindon in his "Fruits and Fruit-Trees," "is it more plentiful or of finer quality than in the southern parts of Ireland. Yet there, this natural gift of the soil, untaxed, uncharged for, 'without money and without price,' while it might be made a source of immense and permanent wealth to the poorer inhabitants, is left wholly untouched; and this when we are sending millions of money every year to foreign countries for fruits that have not half the intrinsic worth of the ill-requited *Rubus fruticosus*." Hogg, in his great English "Fruit Manual," does not mention the blackberry.

"Perhaps it would be casting discredit on the worthy ancestors who braved so many dangers in the settlement of our country to charge them with undue conservatism," writes Professor Card, in a sketch of the blackberry, in "American Gardening," "yet it can

hardly be doubted that men who would brave the uncertainties, not to say terrors, of an ocean voyage on an almost unknown sea, and the settlement of a new country peopled with savages of unknown traits and tendencies, rather than surrender ideas which they cherished, would not be quick to form new ones. Hence we can readily conclude that the blackberry of America was to them much what the blackberry of England had been—simply a wild bramble, to be destroyed when possible and replaced by something better, and whose fruit was to be gathered at will. Moreover, to cultivate a fruit which was so readily obtained in abundance for the gathering would have been folly to them, when many other things conducive to their safety and comfort were so much more needed. As time went on, however, this gratuitous feast of nature, provided for the fostering of 'infant industries,' began to diminish, and the demand of growing cities for increased quantities of fruit doubtless led to the idea of cultivating the blackberry among the rest. Just when this state of affairs was reached it is impossible to say, but evidently not until quite late in our national development, for the blackberry does not seem to have begun to receive much notice or to be talked about in the horticultural journals until about 1850. From 'Hovey's Magazine of Horticulture,' it appears that Capt. Josiah Lovett, of Beverly, Mass., figured prominently in introducing it to cultivation. Even then, as with many other good and useful things, first impressions were unfavorable. Of course, the first effort would naturally be to bring plants which bore the most promising fruit from the woods and clearings, and set them in the garden. This attempt

to tame the wild protégé of the forest did not often prove satisfactory. These plants evidently did not take kindly to the refinements of civilization, and longed for their free and easy life of the wood. Captain Lovett reports repeated failures in trying to get good berries by this method. He persevered for five years, and at last gave up in despair, about 1840, and surrendered this wild gypsy of the fruits to its native haunts as untamable. In spite of these discouraging results he evidently did not give up the dream of a cultivated blackberry, for Downing gives him the credit of having introduced the Dorchester, which in time proved so valuable, although according to Marshall P. Wilder, as reported in the 'Transactions of the Massachusetts Horticultural Society' for 1883, p. 129, it was brought to notice by Eliphalet Thayer, who first exhibited it before that society, August 7, 1841.

"But the first introductions to cultivation, the Dorchester and New Rochelle, were not calculated to bring swift and lasting popularity to the blackberry as a garden fruit, for although large and attractive, their habit of turning black before they are ripe nearly always led to their being gathered and eaten while green, and their consequent condemnation as sour and poor in quality. Moreover, their culture, being little understood, led to frequent failures and unsatisfactory results, while their propensity to persist and spread, aided by their unmerciful thorns, conspired to render them a terror to many timid gardeners. In spite of all this, the blackberry has steadily pushed its way into prominence, until it is to-day one of our most satisfactory and profitable crops. Here, as with all

other fruits, we are far from attaining perfection. We have no ideal variety. If we demand the best in point of hardiness, we must yield in size and quality; if delicacy of flavor is the desideratum, something else will be deficient. Yet to stand by a well-grown row of Early Cluster, for example, to see its glistening sprays of glossy black hanging in such graceful profusion, to gather its magnificent berries and to test their sweet and melting quality, just like those finest and ripest ones you used now and then to chance upon in some wooded nook which everybody else had missed, is to forget for the time being that there is anything further to be desired in a blackberry. Still, we have reason to hope that the achievements of this energetic and vigorous pomological youth are but an omen of what is yet to come."

The blackberry is not mentioned by William Prince in his "Treatise on Horticulture," published in 1828, nor in his son's "Pomological Manual," either in the first edition, 1831, or in the second, 1832. Kenrick, in "New American Orchardist," 1833, mentions the blackberry as being worthy of cultivation, and remarks that plants were then occasionally transplanted to gardens. Speaking of the wild "bush blackberry," he says: "This plant thrives in a rich, moist, sandy loam, and is often cultivated in gardens, where its fruit is much improved in size, and its crops very abundant." "It is singular," he says, "that a fruit so productive as the tall blackberry should be so little cultivated." He also speaks of the "trailing blackberry," and the "white-fruited bramble." William Parry, of New Jersey, says that about 1835 he "planted a patch of blackberries for market, and

But the flavor of the wild berry is usually quite as much a compound of pleasant memories of youthful associations and stimulating adventures as it is of sweetness and flavor; and then, when one picks wild berries he always selects the ripest and the best, and these become the standard with which he compares the untimely fruits which he buys of the groceryman. I also held tenaciously to the opinion that the tame berry is inferior to the wild one until, a few years ago, I visited the wild patch in which grew those incomparable berries of my boyhood. But I found the berries scant and seedy, many of them inexcusably sour, and the briers intolerable. I came back to my Agawams with relish, and they are to this day my ideal of summer fruits.

What a silent evolution the blackberry has undergone! It is not yet fifty years since the first named blackberry, the Dorchester, was introduced to general notice, and, in 1875 that the New Rochelle, or Lawton was exhibited before the Massachusetts Horticultural Society; and thereupon blackberry culture began to attract wide attention in the country. The Lawton held undisputed sway until it was superseded by the Kittatinny some ten or fifteen years later. The Kittatinny, in turn, gave way to the Snyder in about ten or fifteen years, and this latter variety is now the leading commercial blackberry. In the meantime, however, a host of varieties had appeared, very many of them wildings or chance bushes found in fence-rows, but so quietly have they come in that no one has been sufficiently attracted by them to enquire minutely into their genesis or to attempt to classify them into botanical groups. In spite of all the attention given to it, the blackberry is still a neglected and unknown fruit!

The botanical features of the blackberry are obscure and variable. This is true of the genus *Rubus* as a whole, but particularly of the groups which comprise the blackberries and dewberries. It is probable that no two monographers will ever agree upon the limits of the species and natural varieties in these groups. Some classification of these forms must be made, however, before we can understand the evolution of the garden types, and I therefore ask the reader's forbearance if I seem to refine this discussion beyond the needs of a popular narrative.

The High-bush Blackberry and its Kin

The commonest blackberry of North America is an upright and very thorny and villous bush, which produces a long raceme of flowers and fruit. The type of this species may be assumed to be that shown in Figs. 59 and 60.

It is often known as the "high-bush blackberry." The particular marks of this plant are the tall stature; the long stalks to the leaves and the leaflets; the long-ovate, rather thin and shallow-toothed pointed leaflets; the very long, open and leafless simple raceme, with the slender branchlets or pedicels standing off from the central stem at a very obtuse angle. The lowest flowers in the raceme open first. The calyx-lobes are long and narrow. The fruits are oblong and thimble-like, firm, aromatic and sweet when ripe. In cultivation, this type of blackberry is represented by the Taylor and Ancient Briton. For horticultural purposes the group may be called the "Long-cluster Blackberries."*

*This classification was first proposed in Bull. 99, Cornell Exp. Sta. (1895).

Fig. 59. High-bush blackberry (*Rubus villosus* of American botanists,
but now to be called *Rubus nigrobaccus*.) \times two-thirds.

A closely related form, common in open and dryish places, is a bush generally only two or three feet high, bearing a short cluster of small roundish mostly loose-grained fruits. The varieties of this type have a strong tendency to produce a few later fruits on the tips of the new growth. These late fruits often ripen as late as the first week in September. The leaflets are broader, more abruptly pointed, usually thicker and shorter-stalked, and generally very coarsely and unevenly serrate or even jagged. This is the commonest form of blackberry in gardens, and includes such varieties as New Rochelle or Lawton, Kittatinny, Snyder, Agawam, Erie, and Minnewaski. Typical clusters of this group are shown in Figs. 61, 62. It is comparatively few-fruited, leafy, the stems oblique

rather than spreading, the topmost fruits more or less aggregated. The fruits are rounder than in the Long-cluster group, the drupelets larger and mostly softer and less uniform in arrangement. This type I have designated the "Short-cluster Blackberries."

Fig. 61. Snyder. One of the short-cluster types. Full size.

This group is the most prolific in cultivated varieties. One of the recent garden forms is shown in Fig. 63.

A third type of blackberry comprises dwarf, strict, leafy bushes, generally growing on dryish soils from New Brunswick to Kansas and the Gulf, bearing the flowers in short leafy clusters (Fig. 64), the leaflets

small and firm, more or less wrinkled, light colored, persisting long in the fall, smooth or nearly so when full grown, narrow, coarsely toothed. Fruit early,

Fig. 62. Agawam.

roundish, medium to small, the grains large and rather loose. This is a very leafy plant, and is probably a distinct species from the common blackberry. In cultivation, it is known in the Early Harvest




Fig. 63. Mercereau blackberry, four-fifths natural size. An offspring, by selection of plants, of the Snyder.

(Figs. 64, 65), Brunton's Early, and possibly Bangor. The Dorchester, as I have seen it growing in late years, also belongs here, but I do not know if the plants which I have seen are

lineal descendants

Dorchester introd

Captain Lovett.

form (*Rubus argut*

most widely dis-

tributed of any of

our blackberries.

In Texas it is rep-

resented by the

Dallas, which is

the best medium-

early blackberry

for that region.

Varieties of this

type I have called

the "Leafy-cluster

Blackberries."

A dwarfer or

more condensed

form of the high-

bush blackberry is

abundant in the

Adirondacks and

Alleghenies, where

often known as the

tain blackberry.

been distinguished

fessor Porter, wh

described it as *Ru*

losus var. *montanus*, but who now ("Bulletin Torrey Club," xxiii. p. 153) regards it as a distinct species, and calls it *Rubus Allegheniensis*. "Its slender stalks are less prickly than those of the common blackberry," he writes, "and usually reddish, but the chief difference lies in the fruit, which is much smaller, of oblong shape, often narrowed toward the apex (thimble-like), scarcely fleshy, and possessed of a peculiar spicy flavor." The flower clusters are shorter than those of the typical high-bush blackberry, but they are of the same kind, and the leaves also retain the distinguishing features of that species. It is probably only a mountain or highland form of the common blackberry.

A curious variation of the common blackberry is the so-called white blackberry. It has the stems throughout greenish yellow; leaflets much as in the common blackberry in shape and dentation; clusters long and bearing simple bracts, hairy and glandular; fruit small, creamy white or amber-colored. I have known this plant from childhood. It grew sparingly in the woods in western Michigan, and it was occasionally transferred to gardens. In one garden, at least, it has grown for more than twenty years, and it has always retained its characteristics. There is also a patch of it along an old roadside in central New York, where, except in the light color of the foliage, stems and fruits, it does not appear to differ from the normal high-bush blackberries in the neighborhood. It is generally distributed from New York to Michigan, but appears to be very local. The white blackberries sometimes advertised by nurserymen no doubt belong here.



Fig. 65. Early Harvest. Half size.

Certain cultivated varieties, which I have called the "Loose-cluster Blackberries," differ from all the preceding types. The class is characterized by a low and often diffuse growth, broad, jagged and notched leaves, mostly loose-grained, roundish or roundish-oblong

fruits, which are sometimes very large, and particularly by the few flowers scattered on long stems towards the end of the canes. Sometimes the canes have a distinct tendency to root at the tip. The various pictures (Figs. 66-69) show the features of this curious tribe of berries.

The progenitor of these loose-cluster berries was the Wilson Early, which was discovered in the wild about 1854, by John Wilson, Burlington, New Jersey. This attracted much attention in New Jersey, but it was too tender for New York and New England. One of the men to bring this variety into great prominence was William Parry, a nurseryman and fruit-grower of Parry, New Jersey. Fuller says, in 1867: "It is but little known, except in the vicinity where it originated. Mr. Wm. Parry, John S. Collins, Jas. S. Williams, and a few other fruit-growers near Philadelphia have quite extensive plantations of this variety, and from an examination of the fruit the past season, I conclude that it will prove to be one of the most valuable varieties yet introduced." Parry was one of the few horticulturists who has made any definite attempt to originate or breed new varieties of blackberries. I give his own history of these efforts, as told in "Fifty Years Among Small Fruits:"

"In 1860 we planted seeds of the New Rochelle, at that time the largest and most attractive blackberry known, but no attention was paid to crossing the blossoms with another variety, and there was no improvement in the young seedlings, which bore well of large, handsome fruit, very acid and late in ripening. We never disposed of a plant of them, but destroyed them all, as they were not of much value compared with

Fig. 66. Wild blackberry-dewberry hybrid, from central New York.

the celebrated Wilson's Early, which was larger, more productive, and more than a week earlier, and worth two or three times as much per acre as any other blackberry then known; and in 1865 we planted 20,000 Wilson's Early for market; they did well, yielded abundantly, and sold readily at wholesale, by the wagon load, at 50 cents per quart, and were sold at retail from the fruit stands at \$1.00 per quart. The plants sold at \$1,500.00 per 1,000 at wholesale, and retailed at from \$2.00 to \$3.00 each, and some more. One of our neighbors, who planted seventy-five acres of Wilson's Early blackberries, reported his sales of fruit for several years about 1869 to 1872 at \$20,000 to \$22,000 per annum. The Wilson Early was the most valuable blackberry ever grown here; yielded more bushels of fruit and brought more dollars than any other blackberry ever sent to Philadelphia or New York since we have been in the business. In 1870 we selected a healthy young Dorchester and planted in same hill with a strong, healthy Wilson Early for breeders, located far away from any other blackberries. They have done well together, been a mutual help to each other, and we have raised many valuable seedlings from them. They were both early; the Wilson produced the largest berries, the Dorchester had the best canes—strong, upright growers, healthy and vigorous, free from rust, fungus and other maladies so very destructive among some blackberries. We have never observed any defect in fruit or cane of either of those two plants that have grown together now for fifteen years, and we believe they are good stock to breed from yet.

"In 1875 we selected some of the largest, best and

Fig. 67. Common form of wild blackberry-dewberry hybrid, from central New York.

most perfectly developed berries from the Wilson Early plant, which grew in same hill with the Dorchester, planted the seed first in greenhouse, and when large enough to transplant in open field were set in single hills four feet apart in nursery row, and allowed to remain there with good culture and pruning for four years, until the true character of each was developed, and one proved to be superior to all the others, producing an abundance of fruit, larger and earlier than its parent, the Wilson Early. That one best plant was called Wilson Junior, and preserved for propagation. All the rest of that family of plants were destroyed. The Wilson Junior has been carefully propagated, and as fast as the young canes became old enough to bear fruit, have been very satisfactory, and last year (1884) one acre yielded $110\frac{1}{2}$ bushels of fruit by side of five acres of Wilson Early in same field, with similar culture, which averaged but 53 bushels, and the whole crop of blackberries in the county of Burlington, N. J., is reported at 47 bushels per acre. The fruit was large, early and very fine, and sold better in market than any other sent from the Pomona Nurseries, selected berries measuring $4\frac{1}{2}$ inches around lengthwise by $3\frac{3}{4}$ inches crosswise. Many visitors called to see them, and all, so far as we know, thought well of them. * * * *

"In 1877 we again repeated the same experiment, by selecting the largest and most perfect berries from the Wilson Early, grown by side of the Dorchester, planted them separately, grew them four years, then selected the best which is called Eureka, and all the rest of that family were destroyed. Of the Eureka we have propagated several thousand plants. They

are good market berries, large and early, measure 4 inches around lengthwise, and $3\frac{1}{4}$ crosswise; not quite so large as Wilson Junior; therefore we have not disposed of or parted with any plants of Eureka, as we do not approve of adding to the list of varieties without gaining any new and valuable qualities.

"In 1879 we extended the experiment by selecting the best berries from both plants, set the seedlings in rows separately, and when they developed their fruits, we selected two from the Wilson Early seedling, called Rioter and Farmer's Glory; also two from the Dorchester seedling, called Gold Dust and Primordian. All the other seedlings were destroyed. Those four new seedlings were satisfactory last year (1884), bore abundantly of large early fruit. The Gold Dust was remarkable for the short time in which the whole crop was ripening. The first picking was on 4th of July and the last on 8th of July, yielding a full crop of fruit in that short time. In 1880 we increased the number of our experimental hills for breeders, by setting one plant of Eureka and one of Wallace in same hill; also one plant of Taylor's Prolific and one of Eureka in another hill, and in 1883 gathered the best berries from all four varieties, planted the seeds, and now [1885] have the plants growing in nursery rows set six feet apart and all marked with the name of both parents, and date, for future reference." Of these types of varieties, only the two Wilsons ever gained much prominence.

The Wilson Early and Wilson Junior blackberries are still the leading varieties of the loose-clustered type, but the latter is so nearly like the former, that

Fig. 68. Rathbun blackberry. (X two-thirds.)

the two are not generally distinguished. These varieties are early and productive, and where the winters are not too severe, or when the bushes are laid down in winter, they are satisfactory and profitable. Some six or seven years ago a curious plant was noticed in a patch of Wilson Early belonging to John Sterling, Benton Harbor, Mich., where this variety is now extensively grown. This plant was almost completely thornless, and the leaves were broad and rounded. It was, no doubt, simply a seedling of the Wilson Early. It is now called the Sterling Thornless blackberry. The latest addition to this group of blackberries is the Rathbun (Figs. 68, 69), which originated with Alvin F. Rathbun, Smith's Mills, Chautauqua county, N. Y., and which was introduced to the trade by James Vick's Sons, in 1894. This has a habit of rooting very freely from the tips, and the fruit-cluster is very loose, with usually long fruit-stems. It is the widest departure from the high-bush type of any cultivated blackberry which I have seen.

What is the origin of these loose-cluster blackberries? Horticulturists have said that they are hybrids between the common blackberry and the dewberry, but botanists have not investigated them, and they have not admitted hybrids between these very unlike species. But the horticulturists are right. In 1867, Fuller thought that "it is probably a sport of the trailing blackberry [dewberry], or a cross between it and the high-bush." These hybrids of the blackberry and the dewberry are common enough in central New York, although a positive statement that such natural hybrids do exist appears not to have been made

until 1895 (in Bulletin 99 of the Cornell Experiment Station). One is soon able to recognize them by their low, or diffuse, or even half-trailing habit, the broad, jagged and short-stalked leaflets, the loose,

Fig. 60. Showing how the Rathbun propagates by means of tips.

indefinite or scattered inflorescence, and the short, irregular fruits. One occasionally finds them rooting at the tips, like a dewberry (Fig. 69), and sending up strong blackberry-like shoots. It is singular that promising natural hybrid tribes should occur in various genera, as the native plums, apples, raspberries and blackberries. (See page 381.)

The thornless blackberry has lately come into prominence among botanists. (See Figs. 92, 93.) It was thus described by the writer some years ago:*

"A peculiar bush blackberry, with long wand-like canes, and entirely destitute of thorns, was collected a year or more ago by Dr. C. F. Millspaugh in West

* *Agric. Sci.* vi. 66 (1892).

Virginia, at an altitude of 3,500 feet. It appears to be specifically distinct from the common bush blackberry, and it has recently been described as a new species by Dr. Britton under the name of *Rubus Millspaughii* (Bull. Torr. Bot. Club, xviii. 366, Dec. 1891). Dr. Britton knew no other specimens than those of Millspaugh, except a single leaf of it in Linnæus' herbarium, in London, collected by Kalm over a century ago.* I am inclined to think, however, that the species is generally distributed over the northeastern states. I have recently had good specimens of it from the highest mountains of the Smoky range, North Carolina, above 6,000 feet, collected by Chas. A. Kofoid and Mr. Beardslee. In Walter Deane's herbarium, at Cambridge, Mass., there is a specimen of it from Ice Gulch, Randolph, N. H. (White Mountains), collected by J. R. Churchill in 1889, and Mr. Deane says that there is another specimen in the Gray herbarium from the Keweenaw peninsula, Lake Superior, collected by J. W. Robbins many years ago. I have had canes of a perfectly smooth blackberry sent me from northern Michigan (near Grand Traverse), and I have no doubt that they belong to this species, as the angular and furrowed, perfectly smooth canes of *Rubus Millspaughii* are easily distinguished from those of the common blackberry. From all these records, it would appear that the species occurs upon our northern borders, and that it follows the mountains southwards; and this accounts for the finding of the specimen by Kalm, who traveled in Canada.

"Now, as the canes of *Rubus Millspaughii* are per-

*Linnæus described the plant as *Rubus Canadensis*, and that name must replace *R. Millspaughii*, as explained in the succeeding pages.—*L. H. B.* 1898.

fectly thornless, it is important that horticulturists should turn their attention to the species if it gives any promise of good fruit. The so-called thornless blackberries of gardens are only comparatively unarmed forms of the common blackberry. The person who sent me the thornless canes from northern Michigan said that the fruit is good. Mr. Kofoed, who collected the specimens in North Carolina, sends me the following note: 'It seems to be very abundant where it occurs, forming dense thickets of upright stems five to eight feet in height. As late as the 29th of August we found the fruit just turning a faint reddish tinge, and quite palatable and sweet to a hungry man. Natives say that the fruit becomes ripe and black in September. The berries are large, long and slender and very sweet, lacking the sharply acid or bitterish quality of the berries of the lower mountains. There are no thorns or prickles. One can go through the patches unscathed. You may, however, find a few minute prickles on the mid-vein, generally of the terminal leaflet.' This is certainly a promising account.

"There are several botanical characters which distinguish this species from the common blackberry, aside from the absence of thorns. It lacks almost entirely, except on some of the young shoots, the conspicuously pubescent character of the common species. The leaves are thin and the leaflets are sharply toothed and prominently long-pointed. One of the most prominent characters lies in the leaflet-stalks. Upon vigorous shoots the leaflets are five, and the three upper ones have stalks from one to two inches long."

It is now known that this interesting species is

distributed from Lake Superior to the mountains of North Carolina. It is in cultivation in the Cornell gardens, but it seems to have little merit as a fruit plant. It will not be surprising, however, if good

Fig. 70. Topsy blackberry. *Rubus cuneifolius*.

varieties are found in the wild and are now and then introduced into cultivation.

The Topsy blackberry (Fig. 70) is a stiff-growing and exceedingly thorny bush, belonging to still another species, the Sand blackberry, or *Rubus cuneifolius*. The wild plant is shown in Fig. 89. The fruits have

large and loose, very black drupelets, and they are sour even when soft, and are not aromatic. The drupelets cling to the receptacle. In its wild state the Sand blackberry produces many varieties of excellent quality, but the smallness of the fruits hinders their introduction into cultivation.

J. T. Lovett, who introduced the Topsy blackberry, considers it (as he writes me) to be "a hybrid between the Sand blackberry and some other species, perhaps the dewberry, or probably Wilson's Early." I was long inclined to accept a hybrid origin for it, but having studied the Sand blackberry in the field, from New Jersey to Florida, I am convinced that it is only a direct variation of *Rubus cuneifolius*. The Topsy was sent to Lovett about 1884 by a man in south Jersey. It was subsequently sent out by Childs as the Tree blackberry. Lovett dubbed it Topsy, because it is so "wicked" with thorns.*

Hybrids between the raspberry and blackberry have been produced artificially by several persons. The following are records of experiments made by E. S. Carman, and printed in "The Rural New-Yorker" of various dates:

"In the summer of 1886, we applied pollen of raspberry flowers to the stigmas of blackberry flowers, and vice versa. * * * Our work was continued assiduously during the entire period when blackberries and raspberries were simultaneously in bloom. Some twenty seeds formed on the blackberries, and perhaps twice as many on the raspberries. All were planted, separately, of course, in shallow boxes of mellow soil, as soon as they were taken from the fruit. In many

* For accounts of all varieties of blackberries, see Card's "Bush-Fruits."

cases, a single drupe would form; sometimes two or three—rarely more, and never a perfect berry. Without any experience to guide us in raising these fruits from seed, we unwisely took for granted that the fresh seed would sprout in a few weeks, and that the plants would grow to a size which, with protection, might be carried through the winter out of doors. They did not sprout, however, so that it was concluded to bury the boxes until February, and thus expose the seeds to the action of frost. The boxes were removed to the house early in February accordingly. Many of the raspberry seeds sprouted in a short time, though but nine lived to be set out the ensuing May (1887). The blackberry seeds did not sprout at all.

"*The Nine Hybrid Plants.*—The following notes were taken last October. The first plant is 3 feet high, much branched, light green canes, covered with raspberry prickles. Leaflets large, with an occasional imperfect 5-pedate leaf. Under side of leaf glaucous. The second plant is $3\frac{1}{2}$ feet high, with but a single stem without laterals, and nearly without prickles. Scarcely any bloom on the under side of the leaf. Leaflets large and much wrinkled, as in the foreign raspberry. Stem purplish. The third is a puny plant, about 9 inches high, with the prickles of a raspberry, the leaf of a blackberry. The fourth is $2\frac{1}{2}$ feet high, long laterals, purple stem, hooked thorns, like the blackberry, but closer together. Leaflets small, no bloom on the under side. Resembles a blackberry more than a raspberry. The fifth seems to be a small, sickly raspberry, with slender, close-jointed stems. The sixth seems to be a thornless

raspberry. The seventh has large, wrinkled leaflets, borne on two stems $2\frac{1}{2}$ feet high. The stems are light green on one side, light purple on the other. Prickles many and long, but slender and soft. Very little bloom under the leaves. A vigorous plant. The eighth has leaves resembling the blackberry, and without bloom. There were several pedate leaves. Prickles hooked, crowded and stiff. It is very branching, and $2\frac{1}{2}$ feet high. Looks like a blackberry. The ninth is but 9 inches high, though healthy. It resembles the blackberry, except that the thorns are crowded and there are no pedate leaves."—*February 18, 1888.*

"In one box we have seeds of the raspberry crossed with the blackberry; in another, seeds of the blackberry crossed with the raspberry."—*August 14, 1886.*

"Both the raspberry and blackberry buds were opened and the anthers removed while green. Pollen from each was applied to the other, and carefully wrapped up in tissue paper, to prevent contact of pollen from bees or wind. About fifteen berries formed from this hybridization, three-fourths on the raspberry and the remainder on the blackberry. The seeds of the raspberry have already been sown, and those of the blackberries are to be planted when ripe."—*September 11, 1886.—By Farm Ed. World.*

"Three of these plants have fruited the present season. The first is, to all appearances, a raspberry. The plant is very vigorous, the leaves very large, the canes nearly thornless, the berries yellow, of medium size, rather soft and of the quality of the Caroline. Imperfect berries were noticed here and there. The second bears a red berry of the same color, size and quality of the Hansell. Some of these berries were

also observed to be imperfect. The third plant resembles a blackberry in every way, though the spines are less numerous and shorter. Some of the leaves consist of 5-pedate leaflets, as in the blackberry pure and simple. The back part of the leaves has none of the whitish down or bloom common to the raspberry. The canes are furrowed as in the blackberry. The flowers resemble those of the raspberry, and the drupes separate from the receptacle as in the raspberry.

"The best berry bore 5 drupes. These were jet black, of large size, and of the raspberry flavor, in so far as could be judged. It will be remembered that these plants all came from raspberry mothers. If judged from the past season's behavior, it will appear that little is to be hoped from this hybridization. We have about fifteen plants which have not yet fruited, besides quite a number of hybrid seeds produced the present season."—*Rural New-Yorker*, Sept. 22, 1888.

"Another of 'The Rural New-Yorker's' blackberry-raspberry hybrids fruited during the past season—and another chance to record a failure. * * The plant is strong and vigorous, with characteristics both of the raspberry and blackberry. It resembles the blackberry, however, in most respects, though distinctly not a blackberry. There was not a perfect berry on the plant. It is an interesting fact that though the drupelets were those of the blackberry, the flower of the raspberry was pronounced. We have a dozen of these hybrids which have not yet fruited, but those which have fruited give little or no promise that anything of value will ever come from the hybridization beyond the interesting fact itself."—*Rural New-Yorker*, November 23, 1889.

The Dewberries

Within the past few years several varieties of dewberries have come into more or less prominence. The greatest differences of opinion exist as to their merits, and few systematic attempts have been made to determine their peculiarities and values. Some of them must possess value for certain purposes, for they have been strongly recommended by many growers and dealers; and it is also to be considered that the presumption is against any new fruit, especially one which has been rescued from the fields, and any commendation which it receives from honest men is proof that it possesses some points of usefulness. The histories of fruits are soon lost, and all definite knowledge of methods of variation and degrees of improvement is, therefore, impossible. This is nowhere better illustrated than in the dewberries themselves, for although they are among the most recent additions to our fruits, I have found it impossible to learn the exact histories of all of them.

At first thought it seems strange that such unqualified encomiums and sweeping condemnations could be bestowed upon any fruit as have fallen to the lot of the dewberry. But there are reasons for these disagreements, some of which the following pages may discover. Most fruits receive both praise and censure, for there are few which succeed in all parts of the country and under all kinds of management; and if the fruit is wholly new in kind, it is particularly liable to be misunderstood and mismanaged. But it further turns out, upon investigation, that the varieties of dewberries are very

dissimilar, and, therefore, not always comparable with each other and not equally adapted to given conditions. In fact, they represent various distinct species, and marked natural or botanical varieties. It is, therefore, necessary, before proceeding to a discussion of their horticultural values, to distinguish their botanical characteristics. A few years ago, I made an attempt to discover the botanical features of the dewberries, and the results were published in the "American Garden" for November, 1890, and February, 1891, the former issue containing the first accurate drawing of the *Lucretia*. A horticultural and botanical monograph of the dewberries was also the subject of Bulletin 34 (November, 1891) of the Cornell Experiment Station; and a subsequent sketch was made in Bulletin 117 of same station. The main features of the present account of the dewberries are drawn from those papers.

In common-speech, the word dewberry is applied to any trailing blackberry. There are several distinct species or types of trailing blackberries, with only the most prominent of which we need to concern ourselves at present. It would seem as if the dewberries could be at once distinguished from the true or bush blackberries by their trailing habit, but there are forms of wild blackberries which are low and decumbent, as we have seen in the account of the hybrid blackberry-dewberry tribe. The botanists have even described a true trailing form of the bush blackberry (var. *humifusus*), but this variety was founded upon a dewberry itself, and it has now been described as a distinct species under the name of *Rubus Baileyanus*. It turns out, however, that it was described so long

ago as 1823, under the name of *Rubus Enslenii*. There is no true trailing form of the bush or common blackberry (page 352). The best distinction between the dewberries and bush blackberries lies in the inflorescence or flower clusters. In the dewberries the flower clusters are cymose—the center flower opening first,—and the flowers are few and scattered. In the blackberries, on the other hand, the clusters are essentially corymbose or racemose—the lower or outer flowers generally opening first—and the flowers are usually borne in rather dense clusters. The dewberries are also distinguished by propagating from “tips,” while the blackberries propagate by suckers.

All the trailing blackberries, therefore, are specifically unlike the bush blackberries. They are all dewberries. Every one of my readers who has tramped over fields, either in the northern or the southern states, will recall the sprawling, thorny plants, with their little sour fruits and their red-brown autumn foliage.

Dewberries seem to be first mentioned as a cultivated fruit in 1863, in a report of the Fruit Growers' Society of Western New York, when it was said that Dr. Miner, of Honeoye Falls, had two varieties in cultivation. These varieties were not named.

The first variety of dewberry to come prominently before the public was the Lucretia (Fig. 71). The story of its discovery and introduction is told me by B. F. Albaugh, of Covington, Miami county, Ohio, who introduced it to the trade. A young man named Williams enlisted in the civil war from Miami county, Ohio. During most of his service he was stationed in West Virginia, part of the time near

Fig. 71. *Lucretia dewberry*. Half size.

Beverly. While guarding private property there he became acquainted with the woman who afterwards became his wife. He settled on her plantation after the war, and upon it found the dewberries growing wild. He transplanted some to his garden, and these attracted the attention of his father, who visited him in 1875. The following year plants were sent to the father in Ohio, and they were distributed among a few friends. The plants were carelessly dug, however, and only five of the genuine variety happened to be in the lot, and these, along with many worthless ones, chanced to fall into the hands of Mr. Albaugh. From these five plants the present stock has sprung. When the variety was offered for sale Mr. Albaugh named it *Lucretia*, for Mrs. *Lucretia* Garfield. Mr. Albaugh told me that the five original plants were vigorous and fruitful in 1891. A portion of one of the

Fig. 72. A trellis screen of *Lucretia* dewberry.

original plants—about one-ninth of it—was exhibited at the Association of American Nurserymen at Washington, in June, 1886. This specimen bore 978 berries. E. Y. Teas, now of Irvington, Ind., appears to have been the first to figure the Lucretia and to offer plants for sale.

The Lucretia, like all dewberries, has made its way into popular favor slowly. People have not yet learned how to grow these fruits easily and successfully. Many persons laboriously tie them up on wire screens (Fig. 72) or trellises, but the best results—considering the outlay—are obtained when the canes are tied to stakes. In this fashion, they are managed more easily than blackberries, and the earliness of the fruit—ripening a week or two in advance of the blackberries—makes the plant a useful one to the enterprising grower of small fruits.

Another prominent dewberry is the Bartel; and it enjoys the distinction of being the first dewberry, as far as I know, to receive a name. It was brought to notice some time early in the seventies by Dr. Bartel of Huey, Clinton county, southern Illinois. The story goes that the plants appeared in an old corn-field upon his farm, and some of the berries were so large that he conceived the idea of selling plants. He procured a lithograph of the berries,—which did ample justice to the fruit,—described the methods of growing them, and for a time disposed of considerable stock. The introducer was an old man at this time, and was one of those clever and picturesque individuals who often lend an interest to a neighborhood. The first printed record of this berry appeared in December, 1875, in Purdy's "Fruit Recorder"

(p. 182). This is a communication from "T. C. Bartles, of Clinton county, Illinois," and is headed "Bartles' Mammoth Dewberry." The description of the berry runs as follows: "This is a very fine berry, ripening from the last of June until the middle of August. The fruit is very large, rich and juicy, slightly acid, but not so sour as the blackberry. When ripe it is black, and is sufficiently solid to bear shipment with safety. I have had berries over two inches in length and one inch in diameter. They are a perpetual bearer from the time they begin to ripen (in ordinary seasons) until the last of August—having blossoms on the same vine simultaneously with the ripe fruit. They are very prolific, yielding in a fair season from sixty to eighty bushels to an acre. They do not blossom until late in the spring—later than the strawberry—the fruit maturing in from four to six weeks after blossoming—hence they are seldom if ever injured by late frosts in the spring. They are very hardy—having succeeded as far north as Wisconsin and the northern part of Iowa." An account of methods of cultivation is then given. "I shipped some of my dewberries to New York city from this place, for which I received sixteen dollars per bushel. I also shipped to Rockford, Ill., St. Louis, Mo., and to Independence, Iowa, for which I received twelve dollars and eighty cents per bushel; while the highest price paid for strawberries did not exceed, on an average, six dollars and forty cents per bushel. I consider the dewberry the most profitable fruit raised." Mr. Purdy gave roots of this dewberry as a premium to his paper at this time, and among those who obtained it were I. N.

Stone, of Fort Atkinson, Wis., and Hon. B. F. Adams, of Madison, Wis., the only persons, probably, as Mr. Stone writes me, "who had sufficient confidence in it to give it a fair trial." Mr. Stone has made a marked success of its culture, and all the plants set in recent years appear to have come directly or indirectly from him.

The first good account of the Bartel was published in "Garden and Forest," in 1891, by Professor Goff. "In the summer of 1889," Professor Goff writes, "I saw a small plantation of Bartel on the grounds of Mr. H. C. Adams, of Madison, Wis., that at once established my faith in the possibilities of this fruit [dewberry]. I was informed that the most productive season had passed at the time of my visit, and that the berries which I saw were inferior in size to those gathered a few days earlier. But at this time the vines were fairly well loaded with fruit of larger size and more attractive appearance than the finest blackberries, and, to my taste, altogether superior in quality. There is a juicy, melting quality in the dewberry that is scarcely equaled by any other fruit of my acquaintance. The fact that the dewberry is prostrate in its habit of growth is a decided objection to it in climates where winter protection is unnecessary. But in regions of severe winters, the ease with which the plants may be covered is a partial recompense for this fault. It is said that a plantation once started is eradicated from the soil with considerable difficulty, which, if true, is an additional objection to the plant in cultivation. I consider Bartel dewberry worthy of trial by all who are interested in testing new fruits. Mr. Adams, who is an extensive grower of blackberries,

has found this variety more profitable as a market fruit than any blackberries he has grown." The Bartel dewberry is not generally known, even now; but a few persons grow it with much satisfaction.

All this history of the Bartel dewberry is simple enough, as one reads it, but some weeks of labor were consumed in discovering the facts. This is but another illustration of the fact that few useful records are made of plant variation and of horticultural history. Even the proper spelling of the name was not known until this history was recorded in the Cornell Bulletin, seven years ago. It was variously written Bartle, Bartles', Bartell and Bartells', but I have the evidence of a neighbor of the introducer, who is now dead, that he spelled his name Bartel.

The reader may be interested to know how this history was obtained. In the first place, it may be said that there was no record of the origin of the variety to be found in the many books or journals to which the writer had access. He then wrote to Mr. Adams and Mr. Stone, whose success with this dewberry has been mentioned, asking where they obtained the variety. One of them replied that he obtained it years before as a premium to Purdy's "Small-Fruit Recorder," a periodical which had discontinued publication. The writer had no file of this journal; but the editor is living, and he therefore wrote him for information. The editor replied that the correspondent was evidently mistaken, that he had not offered the berry as a premium, to the best of his memory, and that he knew nothing of it. Yet the correspondent was positive in reasserting his statements, and, thinking that the lapse of time

might have dimmed the editor's memory, I set about to procure a file of the eighteen volumes of the journal. The set was found and purchased. One of the volumes contained an account of the dewberry, written by "T. C. Bartles, of Clinton county, Illinois," as already quoted, but the narrative gave no information as to the origin of the berry. It was necessary, therefore, to discover the address of Mr. Bartles and to correspond with him, but I could not secure his address. The editor did not remember it. In vain every horticultural and agricultural report of Illinois was scanned. Files of periodicals were searched. When every resource seemed to have been exhausted, a catalogue of a western spray-pump manufacturer fell into my hands, in which was a testimonial of the pumps signed by T. C. Bartles, Clinton county, Illinois! The catalogue maker supplied the post office address. But it turned out that this T. C. Bartles, of Huey, Clinton county, Ill., was a townsman but not kinsman of Dr. Bartel, the man who introduced the berry! Dr. Bartel had died some years before, but Mr. Bartles was able to supply the history.

It is only within the last ten years that the dewberries have attracted much attention from horticulturists. The varieties have now increased to twenty or more, every one of which seems to have been picked up in the wild. If we would understand these varieties, we must look more closely into the botanical features of the dewberries. The three commonest species of dewberries are *Rubus villosus* (*Rubus Canadensis* of all writers), *R. hispidus*, and *R. trivialis*. The first two are northern species and the last southern.

Rubus hispidus (Fig. 73) is a very slender plant, rarely rising at all above the surface of the ground, and growing both in swamps and upon barren sand. The leaflets are obovate, stiff, and shining above. The flowers are few and very small, and the fruit is small and usually red. The species appears to possess no value as a fruit, and yet it is often confounded with *Rubus villosus* (*R. Canadensis* of the books), which is the parent of some of our cultivated varieties.

The *Rubus villosus*, to which the term dewberry is usually restricted in the North, is much like the southern dewberry, *Rubus trivialis*, in appearance. The chief distinguishing points are these :

Rubus villosus, or northern dewberry (Fig. 74). Main stems or canes rather sparsely and slightly prickly ; leaves thin and deciduous, either destitute of prickles or bearing only weak ones, and more or less hairy ; leaflets ovate ; sepals often prolonged and leaf-like, and sometimes lobed. (See, also, pp. 371–374.)

Rubus trivialis, or southern dewberry. Main canes mostly thickly beset with stout prickles ; leaves firm and nearly or quite evergreen, smooth or very nearly so, the petioles or midribs usually bearing stout prickles ; leaflets oval-oblong or almost lanceolate and small ; sepals not prolonged nor cut. This species is common from Delaware to Florida and Texas, on the sandy lands. The canes often grow ten or fifteen feet in length. It is variable, and attractive varieties are often found. Some forms have even been mentioned as possessing value as ornamental plants. (See p. 376.)

The northern dewberry is a very variable species. In any locality where it grows in abundance a number of unlike forms may usually be found. Some of the

forms are probably worthy ical names. To this species botanical varieties most of vated dewberries belong. I ily divided into two section types :

1. The common dewberries, *Rubus villosus* (or *R. Canadensis*) proper. The leaves vary greatly in size and shape, those upon the bearing canes being small, while those upon growing canes may be nearly as large as the leaves of blackberries.

Four varieties of this type of *Rubus villosus* are in cultivation:

WINDOM, first brought into prominent notice in 1887 by the Seedling Commission of the Minnesota State Horticultural Society. The report of J. S. Harris, one of the Commission, is as follows: "At Windom [Cottonwood county] we met Dewain Cook, of Dale township, a wide-awake man, who is pursuing fruit culture under many disadvantages. He has dis-

Fig. 74. Common dewberry. *Rubus Cuneolensis* of American botanists, but now to be called *Rubus villosus*. \times two-thirds.

covered and is cultivating a hardy dewberry, which, if it comes near up to what he claims for it, will prove of great value to our lists of hardy fruits. It has been cultivated here thirteen years. We have many testimonials showing its hardiness, productiveness, fair size, and good quality of fruit, etc., and have secured plants and had them sent to several of our experiment stations to be tested and reported upon." A. W. Sias, one of the Commission, writes me as follows: "In the fall of 1887, J. S. Harris, Rev. G. W. Fuller and myself were on the Seedling Commission of the Minnesota State Horticultural Society, and while acting in this capacity Mr. Harris and myself visited Dewain Cook, at Windom, and were greatly pleased with the dewberry. His plants were very heavily loaded with good fruit. The fruit is small—perhaps not more than half the size of Lucretia—but what it lacks in size it more than makes up in quality. I purchased 1,000 plants of Mr. Cook while at his place, and set them on a very heavy clay. While they succeeded much better than the Mammoth and Lucretia near by, they did not equal Mr. Cook's plants, which were on soil containing some sand." The variety appears to have been sent out as early as 1886, at least to experiment stations. It was first known as Cook's Hardy. The exact origin of this dewberry is not known. Mr. Cook informs me that he obtained his plants from a neighbor, J. Q. Pickett, who had been growing them for seventeen or eighteen years, but who refuses to disclose the origin of the variety. Mr. Pickett came from Iowa, and it is commonly thought that he brought the dewberry with him and that it grew wild in that state. Mr. Cook resides near the Mennonites, and some have supposed that the variety was originally introduced by

them from Russia, but I fail to find anything in the botanical features of the plant which leads me to suspect any other than an American origin.

LUCRETIA'S SISTER, discovered, or at least introduced, by J. B. Treedway, of Brandt, Miami county, Ohio, about 1886. I grew it in 1887, and a sprig of the plant is illustrated in the "American Garden" for February, 1890. It appeared to possess no value with me, and I have not grown it since. It appears never to have attained to any reputation.

GEER, discovered in a wood-lot upon the property of a Mrs. Geer, of Plainfield, Livingston county, Mich., by F. L. Wright, a horticulturist of that place. Plants were transferred to the garden in 1887, but it is not generally introduced. It is a small berry, but a fair cropper.

MAYES, or AUSTIN. This berry, with which I have small acquaintance, seems to be a large and strong form of *Rubus villosus* (common dewberry). It is a Texan variety, and was first described in the "Horticulturist," Pilot Point, Texas, for December, 1889. It is said to be "a supposed cross between the common dewberry and the native Texas blackberry." The history of this berry is given me as follows by Dr. A. M. Ragland:

"About the year 1879 I purchased a hundred acre tract of land three miles east of Pilot Point, on Pecan creek. South of this and joining it was a tract which was purchased about two years later by John Mayes. There was only a wire cross fence between the farms. On both of these tracts of land, east of Pecan creek, there were twenty-five or thirty acres covered with dewberry and the wild Texas or Dallas blackberry. These dewberries were the common dewberry found

growing in many places in Texas and Louisiana. People from our town were in the habit of visiting this dewberry and blackberry field every spring, to gather first the dewberries, and later the blackberries. After Mr. Mayes came into possession of the farm, he began to cultivate the land where these berries grew, and discovered this berry occupying a small area of not more than half an acre, or an acre at most. The berries were so much finer than the other dewberries growing all around it, that he decided to save them. He plowed them, and found they grew firm, and so he began bringing his surplus above home consumption to town to sell. Their large size and earliness attracted the attention of our Pilot Point Horticultural Society, so that a member asked Mr. Mayes to bring them plants—one or two hundred each. Among those purchasing them at this time were Mr. J. W. Austin, Mr. Sam Gaines and myself. That was about 1888 or 1889. Since then these berries have continued to grow in popular favor. The name, Mayes Hybrid, was suggested by myself, because the plants were found growing where both the common dewberry (*Rubus trivialis*) and common Texas blackberry, now known as the Dallas berry, were both occupying the locality indiscriminately. Col. W. W. Ross, who then lived here, and myself proposed to Mr. Mayes to call it the Mayes Hybrid and form a company, known as the Mayes Berry Company, to propagate and sell the plants. I first advertised them in 'The Horticulturist' as the Mayes Hybrid Blackberry."

J. W. Austin, of Pilot Point, Texas, also propagated the plant, and introduced it as Austin's Improved Dewberry.

The MAYNARD, a Kansas variety, is one of the novelties. It has a peculiar habit, intermediate between *Rubus villosus* and the blackberry, but it seems to be nearer the former. Card considers it a hybrid.

2. The Lucretia sub-type, variety *roribaccus* (Fig. 71). As compared with *Rubus villosus* proper, this variety is a much larger and stronger grower; leaves large and the margins doubly serrate with small teeth, and more or less notched or jagged: leaflets broad at or below the middle, sometimes triangular-ovate; peduncles or flower stems much longer, straighter and stouter, more erect, habitually more numerous and more conspicuously overtopping the leaves; flowers very large and showy (often two inches across); sepals uniformly larger, some of them much prolonged and leaf-like and conspicuously lobed (sometimes becoming an inch long and wide); fruit much longer and larger as a rule, and more or less thimble-shaped. Strong forms of *Rubus villosus* itself often look much like this in foliage, but I have never seen any in which there was such a development of long flower stems, large flowers and fruits, and large sepals. The Lucretia appears to be the only variety of this sub-type in cultivation.

The Bartel type, or *Rubus invisus*, is particularly distinguished by the large and nearly simple teeth of the leaves and the very long and ascending flower stems. Canes stout and stiff, often partially ascending; leaflets larger than in *R. villosus*, broad and thin, smooth or very nearly so, the teeth usually very large, simple and often rounded and terminating in a minute point; peduncles or flower stems long and straight; young flower buds commonly bearing a prominent tip

formed by the connivent ends of the sepals; flowers commonly larger than in *R. villosus*. As the wild

Fig. 75. *Rubus invisus*, the Bartel type.

plant grows in New York, and as it is seen in the cultivated varieties, it appears to be very distinct from *Rubus villosus*. But there may be intermediate

forms, and the botanical rank of the species cannot be fully determined until our rubuses have received further study. The cut (Fig. 75) shows a flowering stem of the wild plant which grows at Ithaca, New York. It grows here upon a rocky hillside, completely covering the ground with a tangled mat a foot or a foot and a half thick. The first ripe fruits on this wild patch appear late in July. The fruits are small, containing from six to eighteen drupelets, and are of no value. In cultivation, this type has given us the Bartel, already mentioned, and the three following:

GENERAL GRANT, introduced by Charles A. Green, of Rochester, N. Y., in 1885 or 1886, as a premium to his "Fruit Grower." It came from M. W. Broyles, somewhere in Tennessee. Mr. Green informs me that the variety did not prove to be as valuable as represented to him, and he therefore dropped it. I first grew the variety in 1886, and it seems to possess little value. The variety has never become prominent.

NEVER FAIL. I know this only from a specimen and notes sent me by F. L. Wright, Plainfield, Mich., who obtained it from some person in central Indiana. He says: "It never fails to produce an abundance of wood, but always fails to produce fruit. I never had a perfect berry." It is said to have originated in central Ohio.

MAMMOTH. There are certainly two plants sold under this name, one being *Rubus invisus* and the other apparently true *Rubus villosus*. The former is, I think, the same as Bartel, but the history and characteristics of the latter I have been unable to trace.

So far as I can learn, the commoner Mammoth dew-berry offered by nurserymen is only the Bartel, and the plants which I have grown and seen of it appear to

be the same. The original name of the Bartel was Bartel's Mammoth, and it is now often sold under this name, and sometimes Bartel is omitted. I have written to nurserymen who advertise the Mammoth, and all the replies which I have received state that Bartel, Bartel's Mammoth and Mammoth are the same. It is a common impression among growers and experimenters, however, that the two are distinct, perhaps because they were received under different names. Mr. Lyon, in the Michigan report of new fruits, published in 1883, says that the "Mammoth is another variety of similar character [to Bartel] scarcely more productive. Ripe August 1." Separate reports of Bartel and Mammoth are given by the New York State Experiment Station, and Professor Goff speaks of them as different in his articles already quoted in "Garden and Forest," 1891. But no one, so far as I can learn, has pointed out any differences between the two.

One of the replies to my inquiries of nurserymen, from a very prominent western firm, is as follows: "As to Mammoth, we verily believe there is in reality no specific variety generally distributed and known under this name. Twenty years ago Dewey, the plate maker, had a plate called 'Mammoth Prolific Dewberry,' and so long ago as 1873 we scoured the country over trying to find a few hundred of something by this name for a customer who had sold them from the aforesaid plate, but could not learn of anything of the kind then in existence. Since the introduction of Lucretia, a firm in Jackson county, Ill., brought out a variety they called Mammoth, and while we are not absolutely sure, we think it was merely a wild variety which they took up, propagated, and gave this name. We obtained

plants and have had them in cultivation for a number of years. We do not know but that they have done about as well as Lucretia, though we must say that none of the dewberries have been particularly satisfactory with us."

I mistrust that the plate referred to is the one which Dr. Bartel had made for his variety. I have been unable to learn the history of the plate. It seems to have made no impression upon the nurserymen of western New York, where Dewey, the plate maker, lived, and I have not been able to find a copy of it. I feel sure that the common Mammoth is the Bartel.

The other Mammoth is the one referred to in the letter above quoted as coming from a firm in Jackson county, Ill. I understand this firm to be Bailey & Hanford, which is now dissolved. I have been unable to get any direct statement of the variety. I have received the plant from a party who obtained it indirectly from Bailey & Hanford, and it is distinct from Bartel, for it belongs, apparently, to the type form of *Rubus villosus*. I know nothing yet of the value of this Mammoth, but it is certain that it has not become generally known.

In regard to this confusion, Mr. Stone writes me as follows: "The Bartel was introduced as Bartel Mammoth, and is generally known by this name now, but the word Mammoth has been dropped by some on account of there having been an entirely worthless variety called Mammoth sent out quite extensively. It is for this reason that I have dropped Mammoth. The variety sent out under the name had a much larger cane and blossomed freely, but never set any fruit; at least this was the case with the stock I had."

There are many other interesting forms of the

common dewberry which will no doubt be introduced into cultivation in the course of time. The features of the species have not been closely studied by botanists. I cannot forbear, in passing, to speak of one very promising form which I have collected in the drifting sand upon the banks of Lake Michigan, in

Fig. 76. *Rubus villosus* var. *Michiganensis*.

southwestern Michigan. This is a very leafy and vigorous, long-running plant, which produces large globular-oblong fruits of excellent quality, and which seems to be distinguished from all other dewberries in the very deep and sharp, irregular teeth of the leaves. (Fig. 76.) In my herbarium, Professor Card has named this plant *Rubus villosus* var. *Michiganensis* (see p. 374).

A plant which has long been confounded with *Rubus villosus* is the *Rubus Enslenii*, or *Rubus Baileyanus* of Britton ("List of Pteridophyta and Spermatophyta," 185, 1894). This is a slender plant, with weak spines or none, and almost herbaceous shoots, small flowers mostly in 1- or 2-flowered clusters, and very broad and thin, doubly toothed leaves (Fig. 87). It seems to be a good species. It occurs freely in eastern New York and in Pennsylvania, and I have collected it in southwestern Michigan. It is probably generally distributed in the northwestern states. This is the plant which Torrey had in mind when he founded *Rubus villosus* var. *humifusus* (Fig. 77), which has ejected so much unnecessary confusion into the knowledge of the high-bush blackberry, for this blackberry has no trailing forms (page 331). The picture (page 353) is a photograph of Torrey's original specimens, collected at West Point.

The southern dewberry, *Rubus trivialis*, is represented in cultivation by the Manatee, introduced in 1889 by Reasoner Brothers, Manatee, Fla.; Bauer, sent out in 1890 by Bauer's Nursery, Judsonia, Ark.; Wilson's White, introduced in 1890 by Samuel Wilson, Mechanicsville, Penna. (native of Texas); probably the Fairfax, sent out about 1884, by C. A. Uber, Fairfax county, Va.

The Pacific coast also has a native dewberry, and, like most rubuses, its nomenclature is confused. The species is not only perplexingly variable, but some plants produce only pistillate flowers, others only staminate, whereas others bear perfect flowers. It appears to have been first described by Chamisso & Schlechtendal in "Linnæa," in 1827, as *Rubus vitifolius*, or vine-

Fig. 77. *Rubus Enslenii*.

These specimens (about half size) are the types of Torrey's *Rubus villosus* var. *humifusus*.—From Torrey herbarium, Columbia College.

leaved bramble. On the following page, in the same volume, the same authors described another form of the species as *Rubus ursinus*, and this is the name by which,

though improperly, the plant is usually known. In 1833, Douglas described it as *Rubus macropetalus*. Four named varieties of *Rubus vitifolius* are in cultivation, the Skagit Chief, Washington Climbing blackberry, Belle of Washington, and Aughinbaugh. The first, as I have grown it, is pistillate, and therefore incapable of setting fruit; and it blooms too early to be pollinated by our eastern dewberries, even if the species were to admit of such cross-pollination. The Skagit Chief (Fig. 78) and Belle of Washington are chance varieties from the wild, and they were distributed sparingly to experimenters late in 1891. The Washington Climbing was introduced in 1892 by Samuel Wilson, Mechanicsville, Penna.

The Aughinbaugh variety is described in "Garden and Forest" for 1894, as follows, by Charles Howard Shinn :

"In blackberries, the Pacific coast has one very variable but important species, *Rubus ursinus* [*R. vitifolius*], bearing an oblong, sweet, highly flavored fruit. This berry still grows in immense patches along the river bottoms, fills the ravines, and even extends far up among the oaks and manzanitas on dry hill-sides. If it fruited abundantly it might long ago have become the parent of many valuable varieties, as has been the case with the blackberry. Occasionally, in rich, sheltered places it bears so heavily that people come for miles to camp in the berry-fields and gather the delicious fruit. Variable in growth, in leaves, and in many other particulars, it seems to vary most in fruitage, and offers peculiar advantages to the skilled hybridizer. As with other members of the family, carefully selected plants from the woods and

bills, transplanted to the garden, amply repay attention. A white variety, found in Del Norte county, has been somewhat disseminated in California, and several other varieties have gained some local reputation. * * *

Fig. 78. Skagit Chief, a form of *Rubus vitifolius*.

"The most remarkable sport of the native blackberry is the Aughinbaugh. The Aughinbaugh was found growing wild on the sandy Encinal, or peninsula

of Alameda, a good many years ago, by a pioneer who once owned many acres there. Aughinbaugh removed it to his garden, cultivated and disseminated it. He lost his estate, and died in poverty; a city is built over his pasture lands, but the wild berry vine he transplanted from under the oak forest which then covered the Alameda shore has preserved his name from oblivion. The Aughinbaugh blackberry, as I have grown it from from his original stock, is a beautiful vine of trailing habit, like a dewberry, but with much larger, darker leaves, and of extremely vigorous growth. Being pistillate, it does not bear well unless planted with other varieties. Properly fertilized, on good soil, and well trained on a fence or trellis, its bearing powers are often astonishing, and in quality it is very fine, but it has never become popular. I may add that for some reason the nurseries did not take it up, and one only finds it now in a few old gardens. Still it ought to be more generally distributed. It has been crossed with Crandall's Early, producing a promising line of seedlings."

Wickson, in his "California Fruits," says that the Aughinbaugh—which is the "most famous" of the native blackberries or dewberries—was "propagated and sold by a man of that name about 1875. It achieved some popularity, but, being a pistillate variety, needed association with other berries to fertilize it. For this and other reasons it became unpopular, and has been nearly lost sight of."

Wickson also makes the following account of this *Rubus vitifolius*: "The most delicious wild fruit of California, and at the same time the most important commercially, is the blackberry. We have one very

variable species, bearing an oblong, very sweet and desirable fruit. It was favorably mentioned by early explorers, was highly esteemed by the Indians, and still plays an important part in domestic economy from Ventura county northward along the coast range. A variety of this species has attained some fame as a 'white blackberry.' It is said that about 1860, parties gathering blackberries about half a mile from Crescent City, Del Norte county, discovered a few bushes or vines loaded with a berry exactly in shape of the blackberry, but of a white or cream color. The whole patch did not extend beyond a space of a dozen feet square, but the vines were luxuriant and bore well. It was a great curiosity, and the place and the berry were much sought for. Since that time the vines have spread gradually over a space of perhaps half an acre of ground. Plants have been taken from this locality to different parts."

Remaining Types of Blackberry-like Plants

There are various other species of rubuses which bear edible and attractive fruits, but which have not yet become prominent in cultivation, or are known only in the wild state. The most remarkable of these remaining types is the Logan-berry (Fig. 79), which was introduced to the public in 1893 by the California Agricultural Experiment Station. The Pacific coast botanists and horticulturists seem to be agreed that this singular berry is a hybrid of the Aughinbaugh dewberry crossed by the Old World type of red raspberry, *Rubus Idæus*. The history of the plant is given by Charles Howard Shinn in "Garden and Forest" for November 21, 1894:

"The Logan-berry originated several years ago in the garden of Judge J. H. Logan, of Santa Cruz, from self-sown seeds of the Aughinbaugh springing up in the moist, warm soil of that sheltered district. The other parent is supposed to be a raspberry of the Red Antwerp type. Raspberries of several sorts grew

Fig. 79. Leaf of Logan-berry, half size. From Rural New-Yorker.

alongside, and, in fact, intermingled. The Logan-berry shows so clearly the mingling of both types that no horticulturist who studies the fruit has doubted that it is a true hybrid of Aughinbaugh blackberry with some large red European raspberry. The result is a very sturdy plant of rambling or trailing growth, needing support to be at its best, but even in this dry climate it

is a vine of unusual substance and healthfulness, resembling the Aughinbaugh blackberry, but readily distinguished from it in the field. The berry is large and solid, resembling the Aughinbaugh in shape, and retaining its delicious wild flavor. It is dark red to purple when fully ripe, and shows in texture, in the easy slipping from the core, and partly in flavor, the raspberry parentage.

"Tests made in different soils and in some very dry situations have shown so far, that the Logan-berry will grow and bear a fair amount of fruit in localities where the gooseberry, currant, high-bush varieties of blackberries and dewberries have entirely failed. As I have said, plants of *Rubus ursinus* are sometimes found thriving very well on dry hillsides with scrub oaks and chaparral, but seldom bear fruit to any extent in such arid places. In other words, some individuals of this variable species of rubus grow in very hot, arid and barren places, and the original Aughinbaugh, though found on a sandy peninsula near the bay, instead of on a hillside, seems to have had the power to transmit this resistant quality, together with an increased productivity.

"The Logan-berry is now grown for market near Santa Cruz and Watsonville, and the results are said to be gratifying, both in regard to price and yield. Like the blackberry, the season is a long one, but I have no data from the berry gardens. It is certain, however, that the area planted is being extended rapidly. The Logan-berry is hardy wherever tested in California, but this proves nothing in respect to its value in colder climates, though its wild blackberry blood must be an advantage, possibly sufficient to counteract the weaker

Red Antwerp cross. The fact that hardly a trace of the raspberry remains in vine, leaf, or general appearance supports this view."

At this writing, the Logan-berry has not been sufficiently tested in the east to enable one to pass upon its merits as a competitor of the blackberry and dew-berry. (See Bulletin 45, Rhode Island Experiment Station, for an account of its behavior in the east.) Although I have not had opportunity to study this berry in the field, I am unable to detect evidences of hybridity in herbarium specimens of it; and it does not appear to present characters which could not readily be derived directly from *Rubus vitifolius*.

Another western blackberry which has been much talked about, and which is said to be very promising for the Pacific coast, is the Oregon Everbearing blackberry. It has also been called the Evergreen and Climbing blackberry. This is *Rubus laciniatus*, a plant long ago described by Willdenow, and the nativity of which is unknown. It is now generally agreed that it is a cut-leaved form of the common European bramble or blackberry, *Rubus fruticosus*. It has long been in cultivation as an ornamental plant, and it has distinct merits in this capacity; but in the eastern states it has never attracted attention for its fruit.

A blackberry which has been singularly overlooked by botanists is one which was described by Bigelow in his "Florula Bostoniensis" as long ago as 1824, as *Rubus setosus* (Figs. 80, 81). This was thought by Torrey and Gray, in the "Flora of North America," to be a form of *Rubus hispidus*. A most careful study of it has been made by Professor Peck, state botanist of New York, who, not recognizing it as

Fig. 80. *Rubus setorus*. Half size.



Fig. 81. *Rubus setosus*. Drawing made from specimen named *Rubus hispidus* var. *suberectus* by Peck.

Bigelow's plant, described it in 1891 as *Rubus hispidus* var. *suberectus* (Fig. 81). It bears a rather small black or reddish fruit, ripening in July and August, of about the quality of the dewberry fruit. The plant is ascending or half erect, the older stems densely clothed with slender but stiff slightly bent prickles. The leaflets are very strongly toothed, not shining as in *Rubus hispidus*, and also thinner and longer than in that species. The plant occurs in New York, Pennsylvania and New England. It is not cultivated. (See page 377.)

A slender and peculiar woods form of the high-bush blackberry, which is shown half-size in Fig. 82, is found upon Mt. Desert, coast of Maine, westward and northward, and which I once named *Rubus villosus* var. *Randii* (see Rand and Redfield's "Flora of Mt. Desert Island," p. 94, 1894), in compliment to Mr. Edward L. Rand, who has been a most energetic explorer of the flora of the interesting island where it is found. It gives no promise to the cultivator, but the student of our native blackberries may like a characterization of it, for the variety is probably widely distributed northwards. Its chief botanical marks are these: Low and diffuse (1 to 2½ feet high), the canes bearing very few and weak prickles or often entirely unarmed, very slender and soft, sometimes looking as if nearly herbaceous; leaves very thin and nearly or quite smooth beneath and on the petioles, the teeth rather coarse and unequal; cluster short, with one or two simple leaves in its base, not villous, and very slightly if at all pubescent; flowers half or less the size of those of the blackberry; fruit small, dry and "seedy." Its chief characters are its low, weak and practically unarmed stems, thin leaves and small flowers. (See page 385.)

Scotia and northern Quebec. It is known under various names, and is very abundant through northern Canada, extending from the Atlantic to the Pacific, and north to the Arctic sea. Growing always in peat bogs at the south, and further north in open boggy places in woods, it is found in the greatest profusion on the barrens beyond the northern limit of tree growth, occasionally ripening its fruit within the Arctic Circle. In spite of the fact that it is very susceptible to frost, and that frequently the fruit does not mature at all, it seems to improve in quality, like a few other berries, toward the northern limits of its distribution.

"*Rubus arcticus* and *R. Chamæmorus* are frequently found together, the broad, rose-colored flowers of the one contrasting beautifully with the large, white anemone blossoms of the other. The Cloudberry resembles none of its congeners in color or in flavor. The rich amber or golden berries are only slightly tinged with deep red on the side toward the sun ; and they never have more than the slightest trace of acidity. Indeed, so tasteless is the berry that it can hardly be eaten at all until ripe. The berries when apparently mature are often dry and insipid, tasting not unlike a very young apple ; indeed, the name 'Bake-apple berry,' by which it is known in the maritime provinces, may have been given to it on account of the real or supposed resemblance of its flavor to that of a baked apple.

"When quite ripe, however, the Cloudberry has an intensely sweet, honey-like flavor, slightly recalling that of the large white raspberry of cultivation ; and then, if eaten in small quantities, it is perhaps the most delicious of our northern berries. The *habitants* of Quebec and the Indians prefer it just as it approaches

ripeness and before it has lost its acid taste ; but to southerners it is at that time hardly palatable.

"It is known in northern Quebec and about Hudson's Bay as the Yellow-berry, and in that part of the country there is no fruit more sought after for cooking. A small amount of sugar is needed in preparing it for the table, and jam made from this berry has such a rich and delicate flavor, so unlike that made from any other fruit, that at several of the Hudson Bay Company's posts large quantities are preserved and sent to friends at home. The Chipvegan Indians of the Mackenzie river valley make a sugar from the juice of the birch, in which the Cloudberryes are cooked, and, prepared in this manner, they are considered a great delicacy. Few birds eat the Cloudberry, so that when they are not picked by man they decay slowly on the vines, and finally drop to the ground." The Cloudberry is often mentioned in the narratives of travelers in the arctic.

The Botanical Names of the Blackberries and Dewberries

The most curious and embarrassing confusion has arisen respecting the names of the American rubi of the blackberry and dewberry group. In 1753, Linnæus described *Rubus Canadensis*. In 1789, Aiton described *Rubus villosus*. Linnæus' species has always been taken to be the common dewberry of the North, and Aiton's species has been taken to be the common high-bush blackberry of the North. The original descriptions indicate that the names have not been properly applied by American botanists. Consequently, I had drawings made of the original specimens now deposited in London, and it became evident at once that the species had been misunderstood. I, therefore, laid aside the work of revision of the group, and, consequently, the publication

of this book, until I could personally examine the original specimens. I have now had the opportunity of examining the specimens of Linnæus and Aiton; also those of Willdenow and Link at Berlin, and of Michaux at Paris; and through the courtesy of Professor Dr. Beck, I have obtained drawings and full notes of the specimens of Trattinnick at Vienna.

Having now seen the original types of the American blackberries and dewberries, I am able to make a new disposition of the species. Linnæus' *Rubus Canadensis* is unmistakably the thornless blackberry, which was described in 1891 by Britton as *Rubus Millspaughii* (p. 323). Aiton's *Rubus villosus* is unmistakably the dewberry of the North, the plant to which we have heretofore applied the name *Rubus Canadensis*. His specimens are mostly sterile shoots, and are from plants which were grown in the Kew gardens. These specimens are shown in the illustration on page 372. Ordinarily the dewberry is not villous, and the name, therefore, is a misnomer; but Aiton made the name because the tips of the verdurous shoots of the dewberry contain a villous pubescence. These leafy tips of the dewberry are rarely seen in herbaria, and it is, therefore, not strange that the specimens of Aiton have been misunderstood; but the specimens are nevertheless unmistakably the dewberry.

While the northern dewberry now has a name (*Rubus villosus*), the common high-bush blackberry is left nameless. Our next resource, therefore, is to look up the supposed synonyms of the high-bush blackberry. The *Rubus inermis* described by Willdenow in 1809, and credited by him to North America, is one of these synonyms. The specimens in the Berlin herbarium are unmistakably a spineless form of *Rubus ulmifolius* of Greece! This name is, therefore, disposed of. The next name in order of publication is the *Rubus argutus* of Link, published in 1822. Link's specimens in Berlin are well preserved, and are unmistakably the form of high-bush blackberry which we have known as *Rubus frondosus*. This plant should be regarded as a good species; and since *Rubus argutus* was published two years earlier than *frondosus*, that name must stand. Two rubi were described by Rafinesque in his "Florula Ludoviciana" in 1817 — *Rubus angulatus* and *Rubus nitidus*. Rafinesque left no specimens, and his descriptions are so meager that it is utterly impossible to deter-

mine what plants he meant to designate, and the names must, therefore, be dropped. Kenrick uses the name *Rubus Americanus* for the "bush blackberry" in his "New American Orchardist," 1833; but he probably had no particular form of blackberry in mind, and, moreover, the name *Americanus* was earlier used by Persoon and by Prince.

Rubus flagellaris of Willdenow is a puzzle. The specimens are in the Berlin herbarium, and are well preserved (Fig. 83). Willdenow says that the thing is American, but I have never seen an American plant like it, and it seems to me to be one of the European dewberries. It is a significant fact that this plant, which Willdenow described from cultivated species, is still growing in a number of the botanical gardens of Europe under the name *Rubus Canadensis*. If it is American, it is a most unusual form, modified by cultivation; but I suspect that it is only a form of a European species, allied to *Rubus cæsius*.

The *Rubus procumbens* of Muhlenberg's Catalogue cannot be identified. I have not been able to discover that he sent any specimens under this name to the European herbaria.

In 1823, Trattinnick described two species of rubi (*Rubus floridus*, Fig. 91; and *Rubus Enslenii*, Fig. 87). These have been doubtfully referred to the dewberry of the North. His *Rubus floridus* is a peculiar and well-marked form of the plant which must now be called *Rubus argutus*, whereas his *Rubus Enslenii* is the plant which Britton has recently named *Rubus Baileyanus*.

The *Rubus suberectus* of Hooker, 1833, collected by Richardson in the Lake Superior region, is in the herbarium at Kew, and is the plant which we must now call *Rubus argutus*, Link.

Of all the American blackberries and dewberries of which types are in the European herbaria, only Michaux's *Rubus trivialis* has been properly understood; and even this species has been much confounded with forms of the northern dewberry.

Having now identified the various type specimens in the European herbaria, we are prepared to rename the American species. Before doing this, however, it will be necessary to clarify our minds in respect to the natural groups or species of the plants themselves. While it is to be hoped that the American rubi will never be the subject of such minute division as the European congeners have been, it is nevertheless imperative

that our recognized species should be broken up, if we are to clearly understand them. Of the high-bush blackberry, there are three general types or categories: (1) The common high-bush blackberry of the North, which has large, pointed, villous leaves and long, open, pubescent racemes. (See Figs. 59, 60.) This is the plant which is ordinarily taken as the type of

Rubus villosus, but strangely enough, although the common blackberry, it now has no scientific name. I, therefore, propose to call it *Rubus nigrobaccus* (p. 379). (2) The leafy-cluster type of blackberry, which is characterized by a stiffer and mostly shorter growth, by smaller and usually narrower leaves, short and leafy flower-clusters, and the general, although not complete, absence of villousness (Figs. 64, 65, 90). This plant must now receive the name *Rubus argutus*, Link, and its synonyms are *Rubus frondosus*, Bigelow, and *Rubus suberectus*, Hooker. A very large-flowered, short-clustered and blunt-leaved type of this is the plant which Trattinnick described as *Rubus floridus*, and which I now propose to designate as *Rubus argutus* var. *floridus*. (3) The thornless blackberry type (Figs. 92, 93), which must now be called *Rubus Canadensis*, a synonym of which is *Rubus Millspaughii*.

Another form of the high-bush blackberry is a plant which Porter has named *Rubus Allegheniensis*, or the mountain blackberry. I have not had opportunity to examine this plant in its native state. The herbarium specimens do not always seem to be distinct enough to warrant the separation of the plant from the common high-bush blackberry, but since Professor Porter has studied the plant in its native state for many years, and insists in several publications upon its distinctness, I shall accept it as a distinct species (p. 381). I am the more inclined to this opinion since if the common high-bush blackberry were to be united with the mountain blackberry, *Rubus Allegheniensis* would have to be taken as the type of the species; and I should consider it unfortunate to take a mountain form as the type of a common continental plant. This arrangement gives an analytical and perspicuous treatment to the high-bush blackberries, and should be the means of making the various forms better known. It goes without saying that in plants which are so confused as rubi, intermediate and perplexing forms will be found; but even these forms can be best understood when the plants are broken up into their reigning types.

Coming to the dewberries, we find ourselves in new trouble. In the first place, as we have seen, the common dewberry of the North must be *Rubus villosus* and not *Rubus Canadensis*. This dewberry includes two or three distinct forms, two of which I propose to separate at once as distinct species.

One of these species I shall now call *Rubus invisus* (p. 374), it being the plant which I have formerly described as *Rubus Canadensis* var. *invisus*. There can be no doubt, I think, of the distinctness of this species from the common dewberry. Of the merits of the other species, I am not so well convinced, although from a study of material from several sources, I have decided to separate it as a species. It is the form which has been described by Torrey and Gray as *Rubus villosus* var. *humifusus* (see Fig. 77, page 353). This plant has been recognized by Britton as specifically distinct, and he has named it *Rubus Baileyanus*. As before said, however, this is the plant which Trattinnick has described as *Rubus Enslenii*, and this name must stand. There are still two or three forms of the common dewberry of the North which may need to be separately named, and I suspect that in the near future one or two of them will be elevated to specific rank. One is the plant which I formerly described as var. *roribaccus*, and the other is now described by Professor Card, from notes in my herbarium, as var. *Michiganensis* (p. 374).

The history of *Rubus Enslenii* brings up an interesting question in respect to the variation of the high-bush blackberry. Torrey supposed this to be a form of the common blackberry; and it has been generally considered by botanists that the high-bush blackberry has trailing forms (p. 352). As a matter of fact, however, it has not. There are certain hybrids between the dewberry and high-bush blackberry, but they are so distinct in their characters as to be easily recognized. It was one of these hybrids which Willdenow had when he made the name *Rubus heterophyllus*. The name was published with no description, so that it is not allowed to stand in botanical nomenclature.

The following running sketch will enable us to understand the botanical characters of the East-American blackberries and dewberries :

- A. DEWBERRIES : plants trailing, or at most slightly ascending, usually rooting by means of tips.
 - B. Fruit normally black (sometimes running into white forms).
 - C. Peduncles few- to several-flowered.
1. RUBUS VILLOSUS Aiton, Hort. Kew. ii. 210 (1789). *R. Canadensis*, authors, not Linn. Common dewberry (Figs. 74, 84).
A strong-growing prickly plant, mostly with glabrous stems,

Fig. 84. *Rubus villosus* of Aiton. From original specimens,
in London. \times one-half. (Page 373.)

which sometimes rise a foot or two above the earth and are then prostrate; leaves medium to rather large, firm and thick, of three to seven oval or ovate, rather long-pointed and sharply doubly-toothed leaflets; racemes erect, with leaf-like bracts and from 1- to 3-flowered, the central flowers opening first; fruit variable, but usually globose or ovoid, with a few large and rather loose drupelets, shining black, sour, but becoming sweet at full maturity. This is the common dewberry of the northern states, growing along the roadsides and on banks, the strong stems often reaching a length of five to eight feet. The species has a wide range, occurring as far south as Florida, and west and southwest to Kansas, Oklahoma and Arizona. In its southern ranges, it has been confounded with *R. trivialis*. It is a very variable species, and it is probable that future observations may show that it should be broken up into two or three specific types. The form which Aiton had (Fig. 84), and which is here intended, is the one with large and firm, glabrous leaflets and strong growth. Another form has much smaller and ashy pubescent leaflets, weak growth, and fewer-flowered peduncles; but I am not able to separate these two forms. So far as I have observed them, they seem to be associated with soil and environment.

The Fig. 84 is made from Aiton's type of *Rubus villosus* in the Natural History Museum at South Kensington, London. A and B are exact copies; C is a leaf from a third and remaining sprig. The large specimen is the tip of a verdurous trailing shoot. Such shoots have a villous pubescence, although the species is normally glabrous. The name *Rubus villosus* is, therefore, an unfortunate one for the common dewberry (p. 367).

In cultivation, *R. villosus* has given a number of varieties of dewberries, among them being the Windom, Geer, Mayes or Austin, Lucretia's Sister, and evidently the Maynard.

Var. RORIBACCUS.* *R. Canadensis* var. *roribaccus* Bailey, Amer. Gard. xii. 82 (1891). Lucretia dewberry (Figs. 71, 72, 85).

A robust form, distinguished by large wedge-obovate, jagged leaflets, very long flower-stalks and large flowers (sometimes

*Since it is important, as a matter of nomenclature, to know the date of a new name, it is hereby stated that this book is actually published October 26, 1892.

two inches across), and leaf-like sepals. This is represented in cultivation by the *Lucretia* dewberry, which is a native of West Virginia. (See pages 332-335.) I am in doubt as to

whether this variety actually occurs in the wild state except in the form of the original *Lucretia*; that is, it may be a mere incidental variation from a single plant, from which we have derived a cultivated stock, rather than a true geographical form. It is very well marked in cultivation. It is possible that the variation has been brought about by domestication.

Var. *MICHIGANENSIS* Card in herb. (Fig. 76, p. 351.)

A robust form, with woody stems and comparatively few weak recurved prickles, and strong, upright, pubescent flower-shoots, long stipules and very large leaflets, which are very deeply and irregu-

larly cut. This plant has been collected by myself on the sandy banks of Lake Michigan, in southwest Michigan, where it seems to be distinctly marked.

2. *RUBUS INVISUS*. *R. Canadensis* var. *invisus* Bailey, Amer. Gard. xii. 83 (1891). (Fig. 75, 86.)

A very well-marked dewberry, with somewhat ascending and not very prickly stems, a light-colored foliage, and large, thinnish leaflets which are coarsely and simply toothed; peduncles forking into two or three parts; pedicels long, the flowers large, and sepals leaf-like. This plant grows upon banks and along roads from New York to Alabama and west to Kansas and Missouri. The large, simple notches in the leaves, and the long, forking flower-clusters readily distinguish this plant from its fellows.

In cultivation, it has given the varieties Bartel, Mammoth, Never Fail, and General Grant.

cc. *Peduncles mostly 1- or 2-flowered.*

3. RUBUS ENSLENII Tratt., Ros. Monogr. iii. 73 (1823). *R. cill-
losus* var. *humifusus* Torr. & Gray, Fl. N. Am. i. 455
(1840), not *R. humifusus* Weihe. *R. invisus* Britton, Bull.
Torr. Bot. Club, xx. 279 (1893). *R. Baileyanus* Britton,
Pterid. & Spermat. N. Am. 185 (1893-4). (Figs. 77, 87.)

A weak plant, trailing flat upon the ground, the stems some-
times almost herbaceous, with a very few weak prickles and thin
leaflets; flowers solitary, or sometimes in twos, on short leafy
shoots; fruit small and loose, black. Grows in sandy places,

out the northern states, all it only from southwestern stern New York. The spe-
 iomic importance, being too
 a grower to promise much
 tegrator.

4. *RUBUS TRIVIALIS* Michx.,
 Fl. Bor.-Am. i. 296
 (1803). Southern Dew-
 berry (Fig. 88).

Stems very long, often
 growing ten to fifteen feet,
 mostly thickly beset with
 prickles and sometimes with
 reddish bristles; leaves rather
 short-stalked, and compara-
 tively small, rigid, and ever-
 green or nearly so, the
 petioles and midribs strong
 and prickly, the leaflets vary-
 ing from nearly oblong to
 oblong-ovate; pedicels mostly
 short and simple, termina-
 ted by a large and showy
 flower; fruit variable in size,
 usually oblong, and more or
 less dry and seedy. This
 species is widely distributed
 from Virginia south and
 southwest. It is a variable
 species, running into some
 varieties with rather broad
 leaves and very large flow-
 that two species are confused
 at much of the confusion has
 founding of *R. villosus* with it.
 which Michaux founded the
 with narrow, hard leaflets and

short, straight, prickly peduncles. In cultivation, this species has given the Manatee, Wilson White and Bauer.

In the southwest, from Missouri to Texas, there is a curious form of dewberry which I have at various times intended to make the type of a new species, but which may be a series of hybrid forms between *R. trivialis* and *R. argutus*. It has much the range of variation of the well-known hybrid of the northern dewberry and blackberry, and until I have opportunity to study the plants in the field, I should prefer to call it a hybrid. It is sometimes trailing, and sometimes sub-erect. It is variously pubescent, is usually armed, and sometimes hispid; the flowers are sometimes two or three, and sometimes in elongated clusters; the leaves are very variable, ranging from the narrow forms of some strains of *R. trivialis* almost to the broader forms of *R. argutus*.

Fig. 88. *Rubus trivialis*.
One-third size.

BB. *Fruit red and small, scarcely eatable.*

5. *RUBUS HISPIDUS* Linn. Sp. Pl. 493 (1753) (Fig. 73).

Stems scarcely woody, but lasting over winter, perfectly prostrate, and beset with small, reflexed, weak bristles, sending up many short and leafy flowering shoots; leaflets mostly three, obovate, blunt and shining, firm and thick in texture, and tending to be evergreen; flowers small and few on leafless peduncles; fruit of few grains, red or purple and sour. Sandy places and low woods in the northern states, and southward to the mountains of South Carolina. Linnaeus' specimen is well preserved in his herbarium in London, and is properly understood by American botanists.

AA. **BLACKBERRIES**: characterized by erect or strict growth (No. 6 often an exception), and the plants propagating from suckers.

B. *Plant weak, hispid rather than thorny, the fruit reddish.*

6. *RUBUS SETOSUS* Bigelow, Fl. Bost. ed. 2, 198 (1824) (Figs. 80, 81).

An ascending or almost erect low-growing plant, the older

stems densely clothed with very slender though slightly bent prickles; leaflets usually large, ovate to oblanceolate, pointed, scarcely shining, very strongly toothed; fruit reddish black. In bogs throughout the northern states and southward to Florida and Arkansas. It is distinguished by a light cast of foliage and yellowish prickles. In many cases it looks as if it were a hybrid between a blackberry and red raspberry, and has, in fact, been taken for such. It has ordinarily, however, been confounded with *R. hispidus*, with which it has little in common. The long, slender, and scattered bristles and diffuse, open habit distinguish it from its allies.

BB. *Plant rather low and stiff, very thorny, the under surfaces of the leaves white-pubescent; fruit black.*

7. *RUBUS CUNEIFOLIUS* Pursh.
Fl. Am. Sept. 347 (1814)
(Figs. 70, 89).

A stiff and very thorny plant, growing from one to three feet high; leaflets obovate, thick, dull green above and white-tomentose below; petioles armed; flower-clusters rather small and short, bearing from two to eight flowers, and often leafy below; fruit medium size, firm, but sweet and often delicious. This species ranges from New Jersey to Florida. In cultivation, it has given us the Topsy, or Tree, blackberry, which is characterized by most vicious thorns. Very strong and verdurous shoots of the Sand blackberry bear oblong-ovate leaflets,

which are distinctly pointed and deeply notched, and which tend to lose their pubescence. This fact has led to a misunderstanding of the species. The garden forms have this character of foliage; in fact, the Topsy, when growing vigorously, almost loses the white color of the leaves, and there is little external appearance to indicate that it belongs to *R. cuneifolius*. This fact led me to question the origin of the Topsy blackberry from this species, but a study of the plant in its natural haunts, both in the North and the South, has convinced me that it is a direct cultivated offshoot of the sand blackberry.

BBB. *Plant diffuse and mostly tall, thorny, the leaves and inflorescence distinctly glandular-pubescent; fruit normally black (running into whitish forms).*

8. RUBUS NIGROBACCUS. *R. villosus*, authors, not Aiton. Common High-bush Blackberry, Long-cluster Blackberry (Figs. 59, 60).

Distinguished by very tall and usually somewhat recurved furrowed stems, strong hooked prickles, three to five large ovate or lance-ovate, very distinctly pointed leaflets, which are on distinct stalks, the middle one being long-stalked and sometimes distinctly heart-shaped; the lower surface of the leaves, as well as the framework of the flower-clusters, are hairy and glandular; the flower-cluster elongated, with the large and showy flowers on pedicels an inch or two long, which stand out at right angles to the main axis; fruits rather firm, long, seedy, mostly sweet or aromatic. This is the prevailing high-bush blackberry of woods and fence rows of the North, and extends as far south as the mountains of North Carolina and west to Iowa, Kansas and Missouri. It is perfectly represented in Fig. 59. In cultivation, it has given the class known as the long-cluster blackberries, of which the Taylor and the Ancient Briton are examples. The reason for the giving of a new name to the common blackberry is explained on pages 366 to 368.

Var. SATIVUS. *R. villosus* var. *sativus* Bailey, Am. Gard. xi. 719 (1890). Short-cluster Blackberry (Figs. 61, 62, 63).

Usually somewhat lower in growth, the leaflets mostly broader and less distinctly long-pointed, and the flower clusters distinctly

shorter, fruits rounded and looser, with larger drupelets. This is the nondescript blackberry of open fields, and is the parent of the larger part of the short-cluster or garden blackberries, of which the Snyder and the Kittatinny are the leading examples.

Var. ALBINUS. *R. villosus* var. *albinus* Bailey, Am. Gard xi. 720 (1890). White Blackberry.

An occasional form characterized by a light green or olive color of the bark and amber-colored fruits. It is probably an albinous form of the blackberry, but the plants which I have seen

growing wild have the long clusters of *R. nigrobaccus* rather than the short ones of the var. *sativus*.

The race of hybrids between the blackberry and dewberry (*R. nigrobaccus* \times *R. villosus*) has already been mentioned (Figs. 66–69). These hybrids are frequent in many parts of the northern states, and are usually readily distinguished from either the blackberry or the dewberry by the half-erect habit, the broad and jagged leaflets, the forking, small flower-clusters, and the small, loose-grained fruits. In gardens, offsprings of this cross are the Wilson, Wilson Jr., and Rathbun. These berries are valuable for certain purposes, but ordinarily demand special care and treatment, and are, therefore, not adapted to wide ranges of conditions.

9. RUBUS ALLEGHENIENSIS Porter, Bull. Torr. Bot. Club, xxiii. 153 (1896). *R. villosus* var. *montanus* Porter, l.c. xvii. 15 (1890). *R. montanus* Porter, l.c. xxi. 120 (1894) not Wirtg. Mountain Blackberry.

Plant smaller than the preceding species, and rather more slender and less prickly; the branches and leaf-stalks commonly reddish, and all the recent parts very prominently glandular; leaves much as in *R. nigrobaccus*, with small teeth and distinctly long-pointed, prominently pubescent below; fruit small, long and narrow, tapering towards the top; drupelets numerous and small, forming a dry fruit with spicy flavor. This species occurs on mountains from New York to North Carolina. In its typical forms, it is very well marked, and seems to be worthy specific rank; but in intermediate stations, it seems to grade into the species (p. 370). It has given no horticultural forms.

BBBB. *Plant diffuse or strict, mostly tall, thorny or unarmed, with no (or very little) glandular pubescence; fruits black.*

10. RUBUS ARGUTUS Link, Enum. Hort. Berol. ii. 60 (1822). *R. frondosus* Bigel., Fl. Bost. ed. 2, 199 (1824). *R. villosus* var. *frondosus* Torr., Fl. U. S. i. 487 (1824). *R. suberectus* Hook., Fl. Bor.-Am. i. 179 (1833). Leafy-cluster Blackberry (Figs. 64, 65, 90).

A plant of comparatively stiff and straight growth, usually distinctly dwarfer than *R. nigrobaccus*, with shorter pointed, often narrower and usually more rigid leaflets; stems strong and

Fig. 91. *Rubus argutus* var. *floridus*. From Trattinnick's
type of *Rubus floridus*, in Vienna.

prickly, and the whole plant glabrous or only slightly villous, except in some of the very young parts or rarely in the florescence; flower-clusters short and leafy. Of wider range than *R. nigrobaccus*, extending from Lake Superior and New Brunswick to Florida, Kansas, Oklahoma and Mississippi. It is less common

Fig. 93. Thornless blackberry. *Rubus Canadensis*. X two-thirds.

in the North than *R. nigrobaccus*, but in the South takes the place of that species. From the Carolinas southward, the plant seems to have a habit somewhat different from the northern plant, and it may be that the southern type is worthy of specific rank. The

plant is apparently common in Illinois and southward in the Mississippi region. The canes usually lack the recurved and willowy habit of *R. nigrobaccus*, and the absence of the villous pubescence is marked. The leaflets are often canescent below, and usually a little more coarsely toothed than in *R. nigrobaccus*. In cultivation, the plant has given us Early Harvest, Brunton Early, Earliest of All, and perhaps Bangor; and the plant which is cultivated as the Dorchester belongs to this species, but I do not know if it is the plant which was originally introduced under that name.

Var. FLORIDUS. *R. floridus* Tratt. Ros. Monogr. iii. 73 (1823).

A form with very short and large-flowered clusters, the floral leaves wedge-obovate and rounded at the top. Trattinnick says that Enslen collected this in North America. What its range may be I do not know. I have seen specimens only from Alabama and Mississippi. It has given no cultivated varieties, so far as I know. (Fig. 91.)

Var. RANDII. *R. villosus* var. *Randii* Bailey, Rand & Redfield, Fl. Mt. Desert, 94 (1894.) (Fig. 82.)

Low and diffuse, 1° - $2\frac{1}{2}^{\circ}$ high, the canes bearing very few and weak prickles, or often entirely unarmed, very slender and soft, sometimes appearing as if nearly herbaceous; leaves very thin, and nearly or quite smooth beneath and on the petioles, the teeth rather coarse and unequal; cluster stout, with one or two simple leaves in its base, not villous, and very slightly, if at all, pubescent; flowers half or less the size of those of *R. nigrobaccus*; fruit small, dry and seedy. Woods, Mt. Desert, Maine, New Brunswick, and Keweenaw peninsula, Lake Superior.

11. RUBUS CANADENSIS Linn, Sp. Pl. 494 (1753). *R. Millspaughii* Britton, Bull. Torr. Bot. Club xviii. 366 (1891). Thornless Blackberry. (Figs. 92, 93.) See pp. 322, 367.

This plant has the general habit of *R. nigrobaccus*, but is distinguished by its long and slender petioles, mostly narrow and long acuminate leaves, long stipules, and especially by its lack of pubescence and the general absence of thorns. It is apparently a well-marked species, growing throughout the country in the higher elevations from North Carolina northward.

VII

VARIOUS TYPES OF BERRY-LIKE FRUITS

ALTHOUGH we have now discussed those groups of native fruits in which the greatest progress has been made, there still remain several types of considerable importance; and one of these,—the gooseberries,—is in interest second only to the raspberries and blackberries, among improved native berries. In all these groups, however, the history has been less eventful than in those already discussed; and since it is our primary purpose to record only what has been done and not what may be done, these remaining plants may be given brief running sketches at a single sitting.

In reveiwing these various plants, one is tempted to call attention again to the great native pomological wealth of North America. The species which are considered in this book are but a small fraction of the whole number of promising indigenous species. Another century will see types of fruits of which we know little or nothing, but it is impossible to prophesy from what native sources these types will spring. We have seen how this wealth of native fruits impressed the explorers and colonists. We could glean abundant references to this native wealth from the early records. Thus, William Wood, in 1634, speaks of the berries in the wilds of Massachusetts Bay, as follows: "There is likewise Strawberries in abundance, verie large ones, some being two inches about; one may gather halfe a

bushell in a forenoone: In other seasons there bee Gooseberries, Bilberries, Resberries, Treackleberries, Hurtleberries, Currants; which being dryed in the sunne are little inferiour to those that our Grocers sell in England."

But even the high north has its treasures of native fruit. In fact, it is one of the marvels of travelers that berries are so plentiful and so good in those regions. Even under the snow they preserve their character, and are an indispensable succor when the snow disappears in the spring. It is literally true that in many parts of the cold north, beyond the bounds of civilization, fruits are in plentiful supply the year round.

A recent note in "Outing" speaks as follows of the native fruits of Labrador: "In spite of latitude and Arctic current, Labrador is the home of much that is delicious in the berry world, Three varieties of blueberries, huckleberries, wild red currants, having a pungent, aromatic flavor, unequaled by the cultivated varieties, marshberries, raspberries, tiny white capillaire tea-berries, with a flavor like some rare perfume, and having just a faint suggestion of wintergreen; squash-berries, pear-berries and curlew-berries, the latter not so grateful as the others, but a prime favorite with the Esquimaux, who prefer it to almost any other; and lastly, the typical Labrador fruit, which, excepting a few scattering plants in Canada and Newfoundland, is found nowhere outside of the peninsula—the gorgeous bake-apple [*Rubus Chamæmorus*]. These cover the entire coast, from the St. Lawrence to Ungava. Their beautiful geranium-like leaves struggle with the reindeer moss upon the islands, carpet alike the low valleys and the highest hilltops, and even peep from

banks of everlasting snow. Only one berry grows upon each plant, but this one makes a most delicious mouthful. It is the size and form of a large dewberry, but the color is a bright crimson, half-ripe, and a golden yellow at maturity. Its taste is sweetly acid, it is exceedingly juicy, and so delicate that it might be thought impossible to preserve it."

In a recent report to Congress on the agricultural possibilities of Alaska,* Walter H. Evans writes as follows of the wild fruits: "Alaska is preëminently a land of small fruits and berries. But little attention has been given to their cultivation. What few attempts have been made seem to promise well. Hardly any berries are cultivated except strawberries, currants and raspberries. Of these, both wild and cultivated forms were seen growing, and the adaptability of the wild plants to domestication was very evident. The wild strawberry was seen under cultivation at Wrangell, and specimens of *Rubus stellatus*, known as dewberry, 'morong,' and 'knesheneka,' are growing in a garden at Sitka with apparently considerable success, and it seems probable that more could be done in this line. The flavor of most of the Alaskan berries was found to be excellent, and some of them might be worthy of introduction into portions of the states.

"Of the berries which have the widest distribution, may be mentioned the salmon berries (*Rubus spectabilis*); two kinds of cranberries, the high-bush (*Viburnum pauciflorum*) and the small cranberry (*Vaccinium Vitis-Idæa*); red and black currants (*Ribes rubrum* and *R. laxiflorum*); crowberries (*Empetrum nigrum*); huckleberries (*Vaccinium uliginosum* and its variety,

*Bull. 48, Office of Exp. Stations, Dept. of Agric.

mucronatum); blueberries (*Vaccinium parviflorum* and *V. ovalifolium*); bunchberries (*Cornus Canadensis* and *C. Suecica*); raspberries (*Rubus strigosus*); elderberries (*Sambucus racemosa*); and the 'molka' berry (*Rubus Chamæmorus*). Of less general distribution are strawberries (*Fragaria Chiloensis*), dewberries (*Rubus stellatus*), thimbleberries (*R. parviflorus*), salal berries (*Gaultheria Shallon*), bog cranberries (*Vaccinium Oxycoccus*), wine or bear berries (*Arctostaphylos alpina*), etc.

"Many of these berries are utilized in various ways by the native and white population. In addition to the consumption of fresh berries, there are considerable quantities stored up in various ways for winter use. The white population can, preserve, and make jelly of the different kinds, while among the natives the principal method of preserving them is in the almost universal seal oil, a vessel filled with berries preserved in this way forming with many of the natives a 'potlatch' by no means to be despised. Some of the berries are utilized to a considerable extent in making wine, the wineberry of Kadiak being largely used in that way."

The Gooseberry

Of native gooseberries there are many kinds, inhabiting almost every part of our great territory.* The gooseberry of history is a native of the Old World, and in some parts of Europe, particularly in England, it is very popular, and has reached a high degree of perfection. This European gooseberry was early brought to

*Descriptions of all these species, with pictures of many of them, are to be found in Card's "Bush-Fruits."

this country, but its success is vicarious at the best, owing to the attacks of a native fungus or mildew. Wild berries, therefore, were forced upon the attention of experimenters. Kenrick (1833), who is always strong on the native fruits, mentions no named varieties of American origin, even in the eighth edition of his "New American Orchardist," 1848; but he speaks of a report of excellent wild gooseberries growing in the valley of the Columbia river. Goodrich, however, remarks in his "Northern Fruit-Culturist" (Burlington, Vt.), 1849, that "we have it from good authority that native sorts have been discovered both in New Hampshire and Vermont, well adapted to garden culture."

Apparently the first native gooseberry to receive a name was one originated by Abel Houghton, of Lynn, Mass., and which now bears his name. How Houghton came by this gooseberry seems not to be known. The earliest record I know of it is in 1847, when it was shown before the Massachusetts Horticultural Society. The entry in Manning's history of the society is the following: "The Houghton's Seedling gooseberry, the first of those native varieties which have proved so valuable for their exemption from mildew, was exhibited by Josiah Lovett on the 7th of August." In Downing's "Horticulturist" for 1848,* appears the first full description:

"HOUGHTON'S GOOSEBERRY.—I have been expecting a private opportunity to forward you, ere this, a box of gooseberries, of the best variety I have ever seen. It is so desirable a sort, that I could not well refrain from forwarding a sample, as I now do, by express.

*Vol. ii. 242.

I regret that the specimens are only the gleanings of four bushes, my whole stock of this kind. This gooseberry is a seedling, called here Houghton's. It, I have no doubt, was raised from seed from our native gooseberry. Its leaf, as you will perceive by the enclosed shoot, bears evidence of this origin. This is the only gooseberry cultivated that does not mildew under any circumstances. The cultivators in Lynn, Mass., where this fruit originated, have grown it for three or four years, and their testimony accords with my assertion. The growth is exceedingly thrifty, making long pendent shoots, similar to an English variety called 'Crown Bob.' I have nineteen table varieties, received four years since from Cunningham & Sons, Liverpool, and for my taste, Houghton's Seedling surpasses them all, notwithstanding the fruit is not so large as the European varieties. Most of the fruits I now send you, were taken from shoots grown within one inch of the soil. I have picked at least ten quarts of fruit from four bushes, which were layers two years since. I think that the Houghton's Seedling will supplant almost every foreign variety from our soil. The long shoots which spring from the bottom of the stock often take root themselves. It will be a fine variety for training, as it makes long shoots, and fruits prodigiously, even to the extreme end of the previous year's growth.

"Yours very truly, in haste,

"JOHN M. IVES.

"SALEM, August 15, 1847."

"(If this is a seedling from an indigenous gooseberry, as it appears to be, and one which, being entirely adapted to our climate, never mildews, it

deserves attention. We regret the berries were heated before they reached us, so that we could not judge of their flavor.—Ed.)”

The Houghton is again mentioned in the “Horticulturist” in vol. iii. page 119, and in the volume for 1854, page 104. Cole has it in his “American Fruit Book” in 1849, using an illustration from the “Horti-

Fig. 94. Leaves of *Ribes Grossularia*. Fig. 95. Leaves of *R. oxycanthoides*.

culturist.” Thomas inserted it, but no other native gooseberry, in the fourth edition of “American Fruit Culturist,” 1850. Downing first mentions it in “Fruits and Fruit Trees” in the revision of 1860, and Barry described it in “Fruit Garden” the same year.

Hoping to gain some knowledge of Houghton, I applied to Walter B. Allen, president of the Houghton Horticultural Society of Lynn, who replies as follows, under date of March, 1896: “The Houghton gooseberry was first produced, some sixty years ago, by one Abel Houghton of this city (then town) of Lynn. Mr. Houghton, we are told, took great interest in hor-

ticulture, and many are now living who recollect his beautiful flower garden, almost the only one of note in Lynn in those early days. Mr. Houghton was not a native of Lynn, as we understand it, and there are no descendants of his that we know of. He was called Abel Houghton, Jr., so we infer that his father's name was Abel. Mr. Houghton died many years ago, but when our society was organized, about twenty years ago, many of the chief promoters of the movement, recalling the lovely flower garden of Abel Houghton, Jr., decided to pass his name down by having it placed in Article I. of our Constitution."

The second development in the evolution of American gooseberries was the production of a seedling of the Houghton by Downing, at Newburgh, N. Y. The earliest account of it I know is by "Rusticus," in the "Horticulturist" for 1853,* as follows: "Downing's Seedling Gooseberry, the largest yet known, being about twice the size of Houghton's Seedling, its parent. Pale or light green, without any blush, and smooth. The skin is very thin, and the fruit as delicate and tender as any European gooseberry in its native soil. The flavor and aroma are perfect; sweet, with plenty of vinous subacid. The first describer says: 'I experienced the same satisfaction as I did in tasting the Delaware and Rebecca grapes. It comes up to the best English varieties in our very different climate.'"

Fig. 96. Crown Bob,
an English goose-
berry.

This berry, now known as the Downing, is the

*Vol. viii. 313.

standard of excellence in American gooseberries, and is probably grown more extensively than all other varieties combined; and yet it is only two removes from the wild species.

A third native gooseberry was described in the "Horticulturist," in 1860,* as the Mountain Seedling. This variety was the subject of an editorial note in "Gardener's Monthly," for February, 1863,† at which

Fig. 97. Wild *Ribes oxycanthoides*. Natural size.

place an inaccurate figure is also given. This variety is little grown at present, but it is interesting as being the only domestic named variety of another species.

What, now, are these species of gooseberries? The English type is *Ribes Grossularia*, characterized by a low, stiff habit, firm and thickish leaves with revolute margins (Fig. 94), a downy ovary, and more or less pubescent or bristly fruit (Fig. 96). The Houghton is a form of the native *Ribes oxycanthoides*, a species of

*Vol. xv. 403. †Vol. v. 56.

Fig. 98. Houghton, first remove from the wild species. Natural size.

Fig. 99. Downing, second remove from the wild species. Two-thirds natural size.

more slender, graceful habit than the other, thinner and plane-edged leaves (Fig. 95), and smooth ovary and fruit (Figs. 97-99). This wild gooseberry is native in swales and low woods in the northern states, and westward to Colorado. Pale Red, a variety which is popular in many places, is also *Ribes oxyacanthoides*; and so, too, I am convinced, is the Downing. Beach* has recently suggested that the Downing is a hybrid of *Ribes oxyacanthoides* and *R. Grossularia*, giving, among other reasons for such belief, the fact that its seedlings vary towards both species. But even if the two species were distinct enough to allow young plants to be referred definitely to one or the other, I should still doubt the hybrid origin of the Downing. The evolution of these gooseberries is graphically shown in Figs. 97 to 99.

The commonest wild gooseberry east of the Plains is the spiny-fruited, thick-skinned and long-clustered species, *Ribes Cynosbati*, Fig. 100. It is to this species that the Mountain belongs (page 394). Beach considers this variety to be a hybrid between *Ribes Cynosbati* and the European gooseberry. Although the fruit of *Ribes Cynosbati* is normally hairy or spiny, smooth-fruited forms often occur. Several persons have made promising efforts to ameliorate the species.†

Judged by European standards, the American gooseberry is yet far short of perfection. The English gooseberry fanciers have kept records of the heaviest berries at the shows for two generations, much as a horse fancier keeps records of fast stock. The following records from the "Gooseberry Growers' Register" for 1880 may interest the reader:

*Bull. 114, N. Y. State Exp. Sta.

†See, for example, B. A. Mathews, in Rept. Iowa Hort. Soc. 1893.

HEAVIEST GOOSEBERRY GROWN EACH YEAR FROM 1809 TO 1880

<i>Year</i>	<i>Name</i>	<i>Weight dwts. grs.</i>	<i>Year</i>	<i>Name</i>	<i>Weight dwts. grs.</i>
1809	Sportsman	18 22½	1845	London	36 16
1810	Crown Bob	21 7	1846	London	27 21
1811	Crown Bob	23 18½	1847	London	28 0
1812	Seed. Overall	19 10	1848	London	31 19
1813	Crown Bob	22 21	1849	London	27 19
1814	Viper	25 22	1850	London	27 10
1815	Crown Bob	25 2	1851	London	27 12
1816	Huntsman	26 0	1852	London	37 7
1817	Highwayman	26 17	1853	London	31 4
1818	Yaxley Hero	24 14	1854	London	31 16
1819	Top Sawyer	26 17	1855	Paris	31 17
1820	Huntsman	25 18	1856	Seedling	29 0
1821	Huntsman	25 6	1857	London	29 11
1822	Rough Robin	26 1	1858	London	34 7
1823	Foxhunter	25 2	1859	Antagonist	27 4
1824	Lion	26 5	1860	London	33 0
1825	Lion	31 16	1861	London	29 22
1826	Huntsman	24 6	1862	Antagonist	31 22
1827	Lion	27 7	1863	Antagonist	34 21
1828	Lion	29 0	1864	London	36 4
1829	Lion	25 0	1865	London	33 12
1830	Teazer	32 13	1866	London	26 20
1831	Lion	27 6	1867	Seed. Rover	30 18
1832	Seed. Bumper	30 18	1868	London	29 13
1833	Wonderful	27 17	1869	London	27 19
1834	Wonderful	27 8	1870	Ringer	32 21
1835	Wonderful	24 0	1871	London	31 20
1836	Companion	28 0	1872	Garibaldi	27 9
1837	Companion	23 12	1873	Garibaldi	32 17
1838	Wonderful	30 16	1874	Macaroni	35 10
1839	London	29 0	1875	Bobby	34 20
1840	London	32 0	1876	Ringer	26 10
1841	Wonderful	32 16	1877	Bobby	28 9
1842	London	31 13	1878	Rover	31 19
1843	London	32 0	1879	London	27 18
1844	London	35 12	1880	Garibaldi	31 17

The extent to which the American gooseberries have supplanted the English types in this country may be gleaned from the fact that in 1830 a mention is made of a display of gooseberries before the Massa-

Fig. 100. Wild *Ribes Cynosbati*. Nearly full size.

chusetts Horticultural Society, in which "several fine specimens of English varieties were shown, the premium being awarded to Nathaniel Seaver for the Jolly Angler, the largest of which measured four and a quarter inches in circumference;" whereas, in 1872,

it is recorded that "the prizes for gooseberries were awarded to the Downing, Smith's Improved, and Houghton's Seedling, in the order named. No foreign gooseberries were shown."

In recent years, however, the English gooseberries and their American seedlings have come into new prominence, because fungicides have been devised which keep the mildew in check; yet the Downing is still the standard variety in America, and it gives every promise of holding that position until it is supplanted by other varieties coming from American species or from hybrids with the European species.

Native Currants

Of many species of wild currants in North America, only three seem to have given varieties cultivated for fruit, and of these none are important. The common red and white currants are offspring of *Ribes rubrum* of the Old World; and the common black currants are *Ribes nigrum*, also of the Old World. The former species, *Ribes rubrum*, or a plant very closely like it, is native in cold swamps along the northern borders of the United States and northwards; and if the plant had not already been improved from the European stock, this native plant might have been pressed into service before this. Fig. 101 is an excellent illustration of this wild currant (on the left), as compared with the Victoria, a common variety in gardens. This wild currant usually bears its fruits near the top of the cane, whereas the garden currants are distributed over the greater length of the cane.

The three native currants of which cultivated fruit-

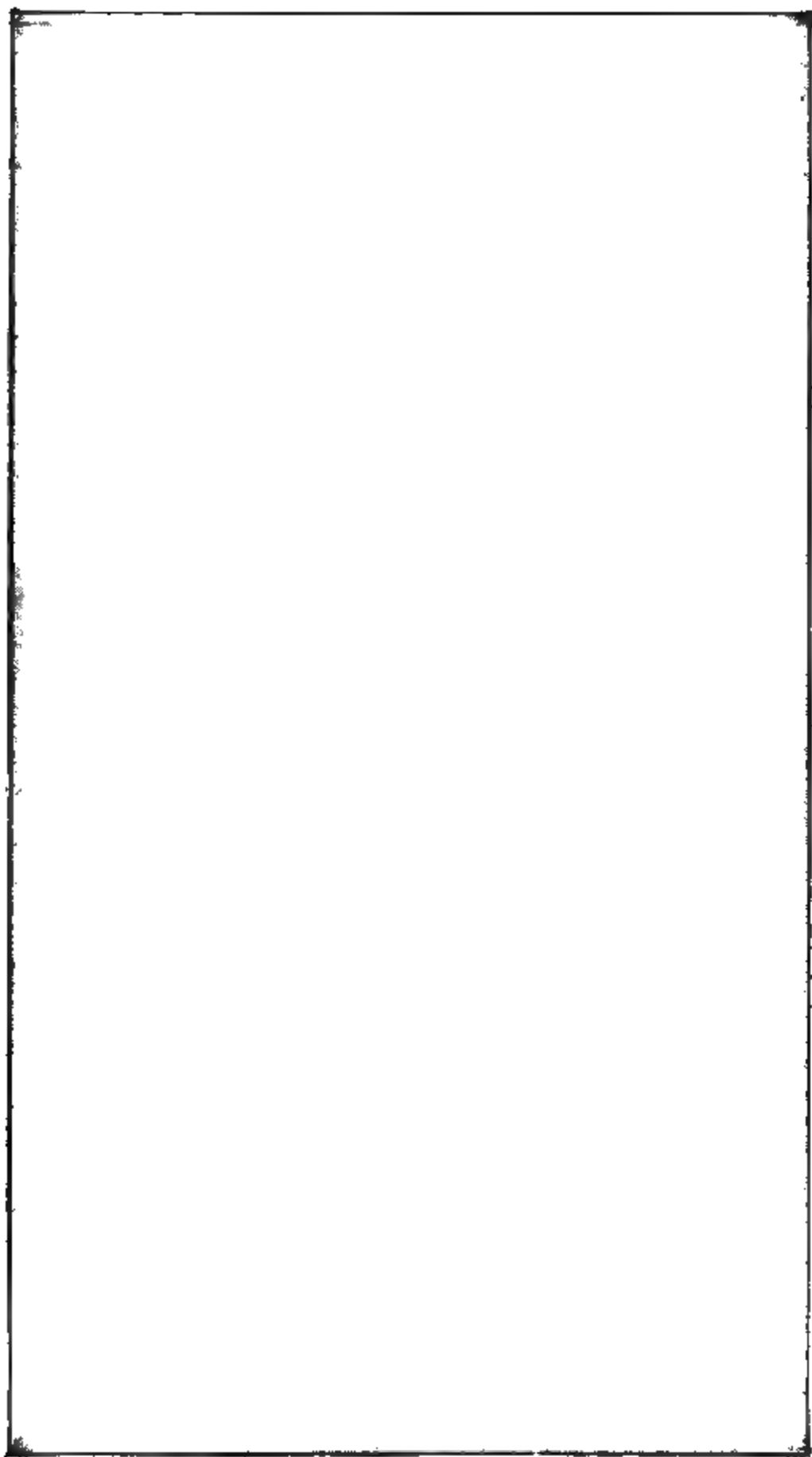


Fig. 101. Wild currant and the cultivated Victoria. Natural size.

varieties are known are *Ribes aureum*, *R. Americanum* (or *R. floridum*), *R. sanguineum*.

Of these varieties, only the Crandall is generally known, and even this has little commercial or even domestic value. This is

Ribes aureum, the so generally known as the falo or Missouri cur

There are a few named fruit-bearing varieties of this species, but they are mostly confined to the dry regions of the West. The species has also been long cultivated as the flowering currant (Fig. 102). It grows wild from Mis and Arkansas westward

The Crandall currant named for R. W. Crandall, of Newton, Kansas, who found it growing. It was introduced in the spring of 1888, by Frank Ford & Son, Ravenna, Ohio.*

This type or species of currant undoubtedly has great promise as the parent of a new and valuable race of small fruit. The Crandall, however, is too variable to be reliable. Comparatively few plants pro-

Fig. 102. Flowers of buffalo or flowering currant.
Half size.

* See *Amer. Gard.* x, 309 (1889); *Bulls.* 15 and 51 Cornell Exp. Sta.; *Annals of Horticulture* for 1891, 52; *Beach, Bull.* 95, N. Y. State Exp. Sta.

duce abundantly of large fruits, while many of them bear fruits little larger than occasional plants of the common flowering currant, to which species the Crandall belongs. When the crop of 1892, at Cornell, was at its height, I made a record of the size of fruit upon each plant, classifying it into three categories—poor, fairly good, and good. The poor fruit was such as appeared to be little larger than the fruit of the flowering currant, or such as is shown—five-eighths natural size—in the lower spray in Fig. 103. The good fruit is represented in the upper spray in the engraving, and it ran from five-eighths to three-fourths inch in diameter. The fairly good fruits were those of intermediate size.

Only a dozen plants out of fifty, or less than a fourth of the whole number, could be called profitable. There is every reason to expect that if cuttings were taken from good plants alone, the Crandall currant would soon rise in popular estimation. At its best, the Crandall has decided merits. The fruits are large and handsome, firm, of good culinary quality, and the plant is thrifty, hardy and productive. The fruits are borne in very short and open clusters, to be sure, but they are not picked by the cluster, like the red and white currants, but singly, like the gooseberries. To some people the flavor of the fruit is disagreeable, and it has been said to have a medicinal flavor; but there are others—the writer included—who are fond of them, even to eat from the hand. In pies and jellies we have found them to be useful. It is not to be expected, of course, that these fruits will find a ready market, because consumers are not acquainted with them; but if the stock were more uniform, I think

that the Crandall could be recommended as a good fruit for home consumption. Since there are undoubtedly possibilities before this type of currant, the introduction of the Crandall has been fortunate. The plant grows readily from seeds, and there should be

Fig. 103. Good and poor types of the Crandall currant.

no difficulty in rapidly securing new varieties; but the seeds should be carefully selected.

In the dry Plains regions, the Missouri currant type has greater promise, not only because it thrives there, but because common currants do not; but the varieties will need to be much improved by careful selection.

The Juneberry

The juneberry grows in many forms over a wide range of North America, particularly in the northern parts, and several varieties have been brought into cultivation from the wild. All these varieties belong to dwarf species. They closely resemble large huckleberries.

Only one of these juneberries has gained popularity. This is the Success (Fig. 104), the history of which, by H. E. Van Deman, the introducer, is thus told in *Annals of Horticulture* for 1891: "In December, 1873, I was traveling on horseback from my home in Kansas to the annual meeting of the State Horticultural Society, and learned by accident of the whereabouts of a fruit, growing in a man's garden, that was called huckleberry. On my way home I hunted up the place, and found the bushes. I was told that this so-called huckleberry bore abundantly every year, and that it had been brought from Illinois to that neighborhood. I afterwards learned that an old man had brought seeds of the dwarf juneberry from the mountains of Pennsylvania to Illinois, and from them grew this variety. When he and his children went to Kansas, about 1868, they took along a stock of the plants, and part of them were set at the place where I found them. I had no trouble in securing a few of the plants, which I immediately took home and set out, and the next year, when the bloom appeared on them, I learned by consulting the botany that it was *Amelanchier*. The plants grew so well that I went back the next year and got several hundred more, and planted them at my home. All of them grew, and I

Fig. 104. Success juneberry. Two-thirds natural size.

soon had a large plantation. About this time I found other varieties of the dwarf juneberry in cultivation in different parts of Kansas, and got plants which bore, and on comparing the fruit with the one I first

got, I thought the first one the best; and as some people discouraged the cultivation of some of the varieties because of their rather inferior fruit, I named my variety 'Success.' About 1878 I began to sell the plants under the name Success, and until I sold the larger part of my stock, some three years ago, to J. T. Lovett, of New Jersey, I had sold more than ten thousand plants of this variety."

This variety Success is of the species *Amelanchier Botryapium* of DeCandolle (1825), also known as *A. oblongifolia* of Roemer (1847). The natural distribution of the species is from New Brunswick to Missouri, although, like the sand cherry and Americana plum, it appears to give its best fruits in its western ranges. The western dwarf juneberry (*A. alnifolia*), which extends eastward as far as Lake Superior, has also given rise to varieties which have been named and sparingly introduced to cultivation. The fruits of the Success juneberry are attractive and toothsome, and the plants are exceedingly hardy and productive. Did not the birds appreciate the merits of the fruits, they might soon become popular in gardens.

The Buffalo-berry

The buffalo-berry of the Plains (*Shepherdia argentea*) has long been known as bearing profusely of excellent and variable acid berries. It was not introduced to the horticultural trades as a fruit-bearing plant, however, until the fall of 1890, when G. J. and L. E. R. Lambrigger, of Big Horn City, Wyoming, offered plants to the general market. Since that time much has been written, in a fragmentary way, on the

buffalo-berry, particularly in the West. It is probable that it will never become popular in the East, where the currant, gooseberry, and other acid small fruits thrive. A Dakotan writes as follows: "Deer, antelope and elk live on buffalo-berries through the winter, but the fruit is excellent for human beings. I do not understand why farmers in the Dakotas and Minnesota do not grow more of these berries. A tree is of more benefit than an apple tree, and is a sure grower. The time will come when people will say: 'Why did we not sooner know about the buffalo-berry?' The trees make good hedges, and live when all other vegetation dies." Although introduced to cultivation, the buffalo-berry has not yet given any distinct named varieties.

The buffalo-berry is dioecious—that is, the sexes are on different plants. This means that the two sexes should be known and be planted close together to insure fruitfulness. Yet, the writer has a pistillate bush of buffalo-berry which is two hundred feet from a staminate plant, with a large building between the two, and it bears well. Professor Corbett makes the following remarks on the sex characters of the buffalo-berry:*

With the introduction of new fruits come new difficulties to be overcome by both propagator and cultivator. In the brief history of the buffalo-berry we find no exception to the rule, but, on the contrary, added natural causes, which augment these difficulties. The dioecious nature of the plant is not known to the majority of cultivators, and, what is the more important, the dealers furnishing them the stock are equally as ignorant. I know of no dealer in nursery stock in the Northwest, even if he is familiar with the fact that they are dioecious, who claims

*American Gardening, xvi. 45 (Feb. 9, 1895). The pictures (Figs. 105, 106) are my own.

to be able to distinguish between the two sexes, except at the fruiting season. It is not unusual to find persons with a stock of the young plants upon the market who are not aware that there are sterile and fertile plants, and that either is worthless without the other. Only last spring a case of this kind came

Fig. 105. Spray of pistillate buffalo-berry.

under my observation. I do not exaggerate the true condition of affairs when I make the statement that 90 per cent of all the buffalo-berry stock placed upon the market is gathered from the native thickets, regardless of sex, by just such men.

Such being the case, what is to be expected in return? Surely nothing more than we have—denunciation by the unfor-

fortunate who have drawn blanks, and praise from the prize winners. This condition of affairs should not exist, for with but little care and time the plants could be marked at blooming season or while in fruit, and in this way the two sexes separated and both obtained. This would, however, necessitate two visits to the native source of supply during the season, and thus add materially to the cost of obtaining a stock of the plants.

There is, however, another and easier way of distinguishing the staminate from the pistillate plants—i. e., by bud characters while in a dormant condition. With care and experience one can readily separate the two. The accompanying illustrations, taken from typical specimens of the two forms, may serve as a basis for the distinction.

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Fig. 106. Spray of staminate buffalo-berry

the buds themselves are more slender, longer in proportion to their diameter than are the buds on Fig. 106, which is from a staminate plant. Upon this the dense groups or clusters of the round-ended buds will be noticed. A study of the plants in the field will enable one to readily distinguish between them.

By observing these simple, yet apparent, characteristics in

the packing-house or in the field at planting time, all the objections urged against the unproductiveness of the buffalo-berry under cultivation would be overcome. It is a plant worthy of attention for its ornamental nature, and yet more for its valuable jelly-producing fruits. At present we have it only in its native state, unimproved by cultivation, yet we find a red and a yellow-fruited variety well enough marked in this one character to deserve the title of a botanical variety. Nature has here begun what the horticulturist only needs to assist, — variation.

The Elderberry

The common elderberry is almost certain to become the parent of a race of domestic fruit-bearing plants. Something has already been done towards its improvement, by introducing good variations from the wild. Professor Budd writes as follows in "Rural Life," March 15, 1894: "An Improved Elderberry.—When R. P. Speer was director of the Iowa Experiment Station he planted out an improved variety of the elderberry found near Cedar Falls. When loaded with fruit last summer, a visitor from Sioux county remarked, in passing the bushes:

" 'I never saw such sized berries and clusters of elderberry. Where did it come from? Why don't you send it out? On the northern prairies it will be valuable for pie making!'

"This variety really shows that the elderberry is capable of improvement by selection. It differs in leaf, habit, capacity for annual loading with fruit, and in the size of the berries and bunches. Last summer, too, we came to the conclusion that it made better pies than the common sort. To those who make fun of the idea of eating elderberry pie, I will merely say:

Fig. 107. Ford elderberry, very nearly natural size.

'Try it before condemning it. With a trace of cider vinegar or lemon juice it is fully equal to the famous huckleberry pie of our early days in the eastern states.' "

"The elderberry (*Sambucus Canadensis*) was introduced independently in 1890 by Frank Ford & Son

(Fig. 107), and D. Brandt, Bremen, Ohio. The stock introduced by the Fords was not named. Mr. Ford writes that he 'did not propagate it for sale, but dug the roots from clumps that produced large fruit. We sold very few plants, and shall not catalogue it again until we can propagate stock from a few plants which I know, and which produce berries nearly one-fourth inch in diameter.' The stock introduced by Brandt was called the Brainard. It was first discovered in a thicket, in Fairfield county, Ohio, by G. W. Brainard." *

High-bush Cranberry (Viburnum Opulus)

The plant which, in the Old World, has given rise to the garden snowball, also produces very acceptable acid red berries. The plant is native to this country, also, and in northern New England and other parts of the northern states and Canada, the fruits are much esteemed for sauces. The plant has been introduced to the trade as a fruit-plant, but no varieties have received names. Fig. 108 is a picture of a cluster of fruit from a plant bought from a nurseryman as high-bush cranberry.

The high-bush cranberry is variable in a wild state, and it is also so unlike the European plant that botanists have long been divided as to whether it should not receive a separate name. For myself, I believe that the plants of the two continents should be regarded as distinct species; and in that case Philip Miller's *Viburnum Americanum* (1768) should be the name of the American plant. Michaux (1803) threw

*Annals Hort. 1891, 52.

Fig. 108. Cultivated high-bush cranberry. *Viburnum Opulus*. Nearly full size.

Viburnum Opulus into three groups or varieties,—*V. Opulus* var. *Europæanum*, var. *Pimina*, and var. *edule*, the two last being North American. Pursh (in 1814) raised Michaux's variety *Pimina* into a species under the name of *V. Oxycoccus*, and his variety *edule* to *V. edule*. Of *V. Oxycoccus* he says: "Berries red, of an agreeable acid, resembling that of Cranberries, *Vac-*

cinium macrocarpon, for which they are a very good substitute." The plant grows on mountains of New York and New Jersey. *Viburnum edule* grows along the banks of rivers from "Canada to New York." He describes it as "a smaller and more upright shrub than the preceding species; berries the same colour and size, but, when completely ripe, more agreeable to eat."

The Cranberry

The cranberry, the most unique of American horticultural products, was first cultivated, or rescued from mere wild bogs, about 1810. Its cultivation began to attract attention about 1840, although the difficulties connected with the growing of any new crop did not begin to clear away until about 1850. Cape Cod was the first cranberry-growing region, which was soon followed by New Jersey, and later by Wisconsin and other regions. The varieties now known are over a hundred, all having been picked up in bogs, and the annual product from tame bogs in the United States is more than eight hundred thousand bushels.

The cranberry industry is so interesting that I transcribe an article which I wrote on "Cape Cod Cranberries," a few years since:*

The cranberry-growing sections of the country are few and scattered. The Cape Cod district is the pioneer ground of cranberry culture, and it still undoubtedly holds first rank in general

*"American Garden," October, 1890. This paper called out an article on cranberry growing in New Jersey, by John B. Smith, "Garden and Forest," November 5, 1890. The books specially devoted to the cranberry are: J. J. White, "Cranberry Culture," 1st ed., 1870, 2nd ed., 1885; James Webb, "Cape Cod Cranberries," 1888; B. Eastwood, "Complete Manual for the Cultivation of the Cranberry," 1856; A. H. Richards, "The Cranberry and its Culture," 1870.

reputation. The country in which these Cape Cod berries are produced is a most peculiar and interesting one. In fact, it is a surprise to anyone not intimately acquainted with it.

Let the reader lay before him a map of Massachusetts, and locate Plymouth and Barnstable counties upon its eastern extremity. Upon the south, Buzzard's Bay thrusts itself between the two counties, and all but cuts off the long and low hook which stretches eastward and northward to Cape Cod. In provincial parlance, the Cape Cod region includes all the peninsular part of the state, beginning with the lower and eastward projection of Plymouth county. The cranberry region extends from this eastern part of Plymouth county eastward to the elbow of the peninsula, or, perhaps, even farther.

Upon one of the upper arms of Buzzard's Bay the reader may locate the old and quaint town of Wareham. Here the tides flow over long marshes bordering the inlet, and rise along the little river which flows lazily in from the Plymouth woods. Here the sea-coast vegetation meets the thickets of alder and bayberry and sweet fern, with their dashes of wild roses and viburnums. And in sheltered ponds the sweet water-lily grows with rushes and pond-weeds in the most delightful abandon. In the warm and sandy glades two kinds of dwarf oak grow in profusion, bearing their multitude of acorns upon bushes scarcely as high as one's head. The dwarf chestnut oak is often laden with its pretty fruits when only two or three feet high, and it is one of the prettiest shrubs in our eastern flora.

We drive northward over the winding and sandy roads into the town of Carver, where the largest cranberry plantations are located. We are now headed towards Plymouth, and our journey lies in the "Plymouth woods." And here the surprises begin! Do you look for fields of corn and grass, and snug New England gardens, and quaint old houses whose genealogies run into centuries? Yes, you are picturing an old and overworn country, from which the impetuous youths have long ago fled to the new lands of the West. But while we are busy with our expectations, we are plunging into a wilderness!—not a second growth, half-civilized forest, but a primitive waste of sand and pitch-pine and oaks! The country has never been cleared, and it is not yet settled! And in its wilder parts deer are still hunted, and

lesser game is frequent! And only fifty miles away is the bustling hub of the universe!

This Cape Cod region is but a part of the sandy waste which stretches southward and westward through Nantucket, along the north shore of the Sound and throughout a large part of Long Island; and essentially the same formation is continued along the Jersey seaboard. Similarities of soil and topography are always well illustrated by the plants they produce. The 'pine barren' flora of New Jersey reaches northward into the Cape country, only losing some of its more southern types because of the shorter and severer seasons. But more diligent herborizing will no doubt reveal closer relationship between New Jersey and Cape Cod than we now know. An instance in my own experience illustrates this. The striped sedge (*Carex striata* var. *brevis*) is recorded as a rare plant, growing in pine barrens from New Jersey southward, and yet in these Plymouth woods, in the half sandy marshes, I found it growing in profusion. Even eastern Massachusetts is in need of botanical exploration! So the floras run along this coast; and it is not strange that Cape Cod and New Jersey are both great cranberry-producing regions.

The country comprises an alternation of low, sandy elevations and small swamps in which the cassandra, or leather-leaf, and other heath-like plants thrive. The pitch-pine makes open and scattered forests, or in some parts oaks and birches and other trees cover the better reaches. Fire has overrun the country in many places, leaving wide and open stretches carpeted with bearberry (*Arctostaphylos*) and dwarf blueberries. There are no fences, no improvements, except such improvised structures as may be seen now and then about some isolated cranberry bog. At one place we came suddenly upon a school house of perhaps twelve by twenty, standing lonely and bare in the midst of a scrub-oak wilderness, with not a house in sight. Clear and handsome little lakes are found in some parts of the wilderness, and upon the banks of one we found a hermitage where a half-dozen Boston men shut themselves off from the world in the summer months. Everywhere one finds clear and winding brooks, abounding in trout. And over all the open glades, the great-flowered aster (*Aster spectabilis*) is brilliant in the autumn sun.

It is in the occasional swamps in this sandy region that the

cranberry plantations, or "bogs," as they are called in Massachusetts, are made. In their wild state these bogs look unpromising enough, being choked with bushes and brakes. It has required considerable courage to attack and subdue them. I am filled with a constant wonder that the sandy plains are not also utilized for the cultivation of blueberries. These fruits now grow in abundance over large areas, and they are gathered for market. It would only be necessary to enclose the areas, protect them from fire, and remove the miscellaneous vegetation, to have a civilized blueberry farm. Certainly cranberry and blueberry farms should make an interesting and profitable combination. The expense of growing the blueberries would be exceedingly slight, and the crop would be off before cranberry picking begins. With greater attention given to the crop, we should no doubt soon find out why it is that the berries fail in certain years, and it is possible that some control could be exercised. I have often predicted that large areas of the great pine plains of Michigan—which look much like the Massachusetts barrens—will eventually be used for the growing of blueberries. To be sure, wild berries are yet common, but they would not interfere with the sale of better and cleaner berries which should come from civilized plantations. Wild cranberries are still abundant over thousands of acres, and the production of cultivated berries is rapidly increasing; yet the price has advanced from 50 cents and \$1 per bushel, with an uncertain market, 50 years ago, to 15 and 20 cents a quart. Wild blackberries are still abundant, yet they do not interfere with the sale of cultivated sorts.

The largest cultivated bog in existence lies about six miles north of Wareham, and is under the management of A. D. Makepeace, one of the oldest and most experienced cranberry-growers in the country. This bog is 160 acres in extent. Other bogs in the vicinity belong to the same management. These bogs are all as clean as the tidiest garden. The long and level stretches, like a carpet strewn with white and crimson beads, are a most pleasing and novel sight. Here in early September a thousand pickers camp about the swamps, some in temporary board cabins, but most of them in tents. The manager furnishes the provisions, which the campers cook for themselves, and he rents them the tents. One hundred and twenty pickers constitute a "company,"

which is placed in charge of an overseer, and each company has a book-keeper. Each picker is assigned a strip about three feet wide across the bog, and he is obliged to pick it clean as he goes.* The pickers are paid by the measure, which is a broad six-quart pail with ridges marking the quarts. Ten cents is paid for a measure. There is wide variation in the quantity which a picker will gather in a day, ranging all the way from ten measures for a slow picker, to forty and even fifty for a rapid one; and in extra good picking, seventy-five measures have been secured.

Various devices have been contrived for facilitating cranberry picking. The Cape Cod growers like the Lumbert picker best.† This is essentially a mouse-trap-like box with a front lid raising by a spiral spring. The operator thrusts the picker forward into the vines, closes the lid by bearing down with his thumb, and then draws the implement backwards so as to pull off the berries. Perhaps a fourth of the pickers use the implement. Children are not strong enough to handle it continuously, and where the crop is thin it possesses little advantage. Raking off the berries is rarely practiced in the Cape Cod region. It is a rough operation, and it tears the vines badly. Late in fall, if picking has been delayed and frost is expected or pickers are scarce, the rake is sometimes used. An ordinary steel garden rake is employed. The berries are raked off the vines, and the bog may then be flooded and the berries are carried to the flume, where they are secured.

This picking time is a sort of a long and happy picnic—all the happier for being a busy one. The pickers look forward to it from year to year. They are invigorated by the change and the novelty, and they must come near to nature in the sweet and mellow October days. Those of our readers who have cast their lot with hop-pickers, or who have camped in the clearings in blackberry time, or who have joined the excursions to huckleberry swamps, can know something of the cranberry picker's experiences. Yet I fancy that one must actually pick the cranberries in the drowsy Indian summer to know fully what cranberry-picking is like.

The berries must now be sorted or "screened." If there are no unsound berries, the fruit can be fairly well cleaned by

*Fig. 90, †Fig. 83(9), "Principles of Fruit-Growing."

running it through a fanning mill; and some growers find it an advantage to put all the berries through the mill before they go to the hand screeners. A screen is a slatted tray about six feet long and three and a-half wide at one end and tapering to about ten inches at the other, with a side or border five or six inches high.* The spaces in the bottom between the slats are about one-fourth inch wide. The screen is set upon saw-horses, and three women stand upon a side and handle over the berries, removing the poor ones and the leaves and sticks, and working the good ones towards the small and open end, where



Fig. 109.
Early Black.

they fall into a receptacle. The berries are barreled directly if they are not moist, but if wet they are first spread upon sheets of canvas—old sails being favorites—and allowed to remain until thoroughly dry.

ted cranberry is a native states. It was first cul-



tivated about 1810, but its culture had not become general until forty or fifty years later. The berries naturally vary in size and shape and color, and three general types, named in reference to their forms, were early distinguished—the Bell, the Bugle and the Cherry. These types are represented in Figs. 109 to 111, respectively. As late as 1856 there appears to be no record of any particular named varieties aside from these general types. But there

*Shown in Fig. 105, "Principles of Fruit-Growing."

are many named sorts in cultivation now. These have been multiplied from some superior or distinct plant which someone has observed and marked. Mr. Makepeace showed me seven varieties in his largest bog.

The common favorite is the Early Black, shown natural size in Fig. 109. This



Fig. 110. Dennis.

is valuable because of its earliness, as it comes in three weeks ahead of the medium sorts. Picking begins upon this variety about the first of September in the Cape Cod bogs. When fully ripe, the berries are purple-

black, and for this reason they are favorites with consumers, for it is a common though erroneous notion that pale berries are unripe. In late fall, the foliage of the Early Black assumes a purplish tinge, which readily distinguishes it from most other varieties.

The Dennis, a bugle berry (Fig. 110), is also a favorite because of its good size, productiveness and bright scarlet color. The fruit is picked late in September and early in October. The foliage is darker than that of the Early Red.

The McFarlin, an oval, dark red berry, is probably the largest late berry grown.

The Gould (named for Dr. Gould, of Cape Cod) is a productive pear berry, of medium season, with a bright purple fruit and light colored foliage.

Lewis is probably the most brilliantly colored of the cranberries. It is a very bright, glossy scarlet, medium in season, and pear-like in shape.

Franklin is a comparatively new pear sort, as late as Dennis,

purple-red, with a high habit of growth. It appears to have little to recommend it above older sorts.

A new berry which Mr. Makepeace showed me appears to combine more merits than any berry which I have ever seen. Some twelve years ago he observed the original plants in a neighbor's bog, occupying a space about six feet square, and he procured a few cuttings. The small bog which he now has of it is well worth a journey to see. The berries are unusually large, cherry-shaped, a little later than Early Black, and a bright rose-

Fig. 111. Makepeace.

purple. It is probably the largest early berry. It is shown natural size in Fig. 111. I take pleasure in calling it the Makepeace.

It is an arduous labor to subdue a wild bog. The bushes and trees must be removed, roots and all, and it is usually nec-

essary to remove the upper foot or so of the surface in order to get rid of the roots, bushes and undecayed accumulations. This process is termed "turfing." The turf is commonly cut into small squares and hauled off. It is necessary to leave the surface level and even, in order that all the plants may have an equal chance and thereby make an even and continuous bed, and to avoid inequalities in flooding. Although the cranberry thrives in swamps and endures flooding at certain seasons, it nevertheless demands comparative dryness during the growing and fruiting season. The swamp must, therefore, be drained. Open ditches are cut at intervals of four or five rods, about two feet deep, and these lead into the main or flooding ditch. It is also often necessary to run a ditch around the outside of the bog to catch the wash from the banks. The areas enclosed within the intersections of the ditches are called sections, and each section is commonly planted to a single variety. The main ditch is usually a straightened creek, or it carries the overflow from a reservoir which may be built for the purpose of affording water to flood the bog. Growers always divert a creek through the bog if possible. In the Cape Cod districts these creeks are often clear trout brooks. The main ditch is strongly dammed to allow of flooding.

Before planting is done, the bog is sanded. This operation consists in covering the whole surface with about four inches of clean and coarse sand, free from roots and weeds. The chief object of sanding is to prevent too rapid growth and consequent unproductiveness of vines. In wild bogs, the cranberry rarely roots deeply in the muck, but subsists rather in the loose sphagnum moss. Vines that grow in pure muck rarely produce well.

The sand also serves as a mulch to the muck, mitigating extremes of drought and moisture. It also prevents the heaving of the vines in winter, and it aids in subduing weeds. Every four or five years after the bog begins to bear it is necessary to re-sand it, in order to maintain productiveness. These subsequent applications are light, however, seldom more than a half inch in depth. The Cape Cod bogs are fortunate in their proximity to the sand.

It was once the practice to plant cranberry vines in "sods," or clumps, just as they are dug from the swamps. There are several vital objections to this operation, and it is now given

up. It is expensive, the vines are apt to be old and stunted, an even "stand" can rarely be secured, and many pernicious weeds and bushes are introduced. Cuttings are now used exclusively. These are made from vigorous runners, and are six or eight inches in length. They are thrust obliquely through the sand, about an inch and a half or two inches of the tip being allowed to project. They are set in early spring, about fourteen inches apart each way. In two or three weeks they begin to grow, and in three or four years a full crop is obtained. The subsequent cultivation consists in keeping the bog clean. A small force is employed during the summer months in pulling weeds. Under ordinary conditions it costs from \$300 to \$500 per acre to fit and plant a bog.

Opinions vary as to the best times and frequency of flooding. There are those who contend that flooding is not necessary, and it is a fact that there are some "dry bogs" which are successful. It is no doubt true that the value of flooding varies with conditions. It appears to be generally held that bogs are longer lived and more productive if judiciously flooded, and it is certainly true that flooding is often the very best remedy for insect attacks. The reasons for flooding, so far as I know, are five: (1) To protect the plants from heaving in the winter; (2) to avoid late spring and early fall frosts; (3) to drown out insects; (4) to protect from drought; (5) to guard against fire, which sometimes works sad havoc in the muck. Mr. Makepeace prefers to flood but once a year, unless insects appear in serious numbers. He lets on the water in December and draws it off in April or early in May. Just enough water is used to completely cover the vines in all parts of the bog.

There are many hindrances to cranberry-growing. The chief are spring and fall frosts, hail, numerous insects and some fungous diseases. During the summer season the bogs are not flooded, and insects must be kept in check by insecticides. Tobacco water is commonly used. The liquid is applied with hand-pumps from the middle of May to late in June. It is supposed that it has some value as a fertilizer also.

Fifty barrels per acre is a good crop of cranberries, yet 200 barrels have been produced. The grower usually gets from \$5 to \$10 per barrel of 100 quarts. It does not appear to be known

how long a well-handled bog will continue to be profitable, but Mr. Makepeace assures me that he knows a bog thirty years old which is still in good condition.

This cultivated cranberry is *Vaccinium macrocarpon*. There are other edible species, but they are not cultivated. The cowberry, or mountain cranberry, *Vaccinium Vitis-Idæa*, is gathered in great quantities in Canada, where it is used for sauces (page 388). It is also native to Europe, where it is also much prized as a culinary fruit.

The Strawberry

Wild strawberries are among the commonest and most esteemed of American fruits. They run into many forms, into so many, in fact, that botanists cannot agree as to what are varieties and what are species. From the earliest times, the native strawberries have been transferred to gardens, and at one time considerable progress had been made in their amelioration. Of some of this early history in New England, Stone writes as follows:*

It is well known that this fruit has been cultivated for centuries in the Old World, but some misconception seems to exist in regard to the date of the cultivation of the strawberry in New England, as well as to its abundance in early times. In the last report of the Connecticut State Board of Agriculture, page 66, a member stated that he could not find that the strawberry was cultivated here in gardens previous to 1824. Dr. Timothy Dwight, in his delightful volumes of "Travels in New England," published in 1821, though written earlier than 1817, gives a list of five different varieties of strawberries, four of which he had under cultivation in his garden. He mentions the following

* G. E. Stone, "The Strawberry in New England," Garden and Forest, Feb. 26, 1896.

varieties: The Red Meadow, White Meadow, Field, Hudson and Hautboy. Dr. Dwight says: "The Meadow strawberry of this country is the best fruit of the kind which I have seen. It is rather larger than the Chili Sweet, and more prolific. It also improves greatly by culture. I have seen several which were four and a half inches in circumference, many which were four, and bushels which were between three and four." And he further states: "I have cultivated the Wild Meadow strawberry more than twenty years, and during that time it has increased to twice its original size."

In regard to the Field strawberry, he says that it "is sweeter, ten days earlier, but much smaller than the Meadow strawberry, and has not increased in size by a cultivation of eight years in my garden. The plants become immediately much larger, but the fruit has not been changed at all." He also mentions the Hautboy and Hudson varieties as having been in cultivation for many years in his garden. The former variety is a well-known European form; the latter is a form I am not familiar with, although I suspect it to be an old cultivated variety common in these days. These statements of Dr. Dwight, who died in 1817, show that the strawberry was in cultivation in New England before the beginning of this century.

He, moreover, states that the Hautboy strawberry, *Fragaria elatior*, has been found growing spontaneously in two distinct and remote localities in Connecticut. This statement, if true, would undoubtedly indicate that they were introduced through the agency of birds.*

The White Meadow strawberry which he calls attention to is a mere sport or variety of the ordinary Red strawberry. It is also mentioned by Dr. Dewey, in his "Plants of Massachusetts," 1840, page 59, as occurring plentifully in the Berkshire Hills.

In regard to the abundance of the strawberry in early times, there appears to be some misconception also. Every one is aware that there are few places in Massachusetts where it would be possible now for one to gather more than a few pints of strawberries in a whole day. In early times, however, when there was more virgin soil than there is to-day in New England,

* The native wild *Fragaria vesca* (or *F. Americana*) was probably confounded with the European Hautbois.— L. H. B.

the wild strawberry was very abundant, and frequently grew to a much larger size than at present; and even within the recollection of men now living, this fruit was by no means rare in this state, neither is it in Nova Scotia and New Brunswick to-day. William Wood, an early visitor and accurate observer, states in his "New England Prospect," published in 1635, that "there is, likewise, growing all manner of Hearbes for meate and medicin, and that not onely in planted Gardens, but in the woods, without either the art or helpe of man. * * * There is, likewise, Strawberies in abundance, verie large ones, some being two inches about; one may gather halfe a bushell in a fore-noone" [p.386]. And in 1643 Roger Williams wrote: "This berry [Strawberry] is the wonder of all the fruits growing naturally in those parts; it is of itself excellent, so that one of the cheiftest doctors of England was wont to say that God could have made, but never did, a better berry. * * * In some parts, where the natives have planted, I have many times seen as many as would fill a good ship within a few miles' compasse. The Indians bruise them in a mottar and mixe them with meale and make Strawberry bread." Strawberry bread appears to have been in common use among the Indians, as we find it mentioned by other writers, notably Gorkin, who was a co-worker with Rev. John Eliot among the Nipmucks and other Massachusetts tribes. These statements, with many others which could be cited, show conclusively that the wild strawberry was once very abundant here in New England, and undoubtedly the principal reason for the decline of this wild fruit is the exhausted conditions of our soil. In early times the clearing of an old wood gave rise to abundance of these berries, and they were noted as being abundant in our meadows. The strawberry, however, is not the only natural crop that has changed. Many of our meadows, which now produce a crop of grass hardly worth cutting, once supported a luxuriant growth of the fowl meadow grass, "thick and long, as high as a man's middle, some as high as the shoulders, so that a good mower might cut three load a day." To-day, however, hardly less should be expected, since for generations crops have been removed from the soil without the return of any plant-food, whereas in olden time, before the advent of the white man, everything was allowed to decay

where it fell, which meant a considerable yearly increase of organic matter to the soil.

The advent of the Chilean strawberry in European and American gardens, and its phenomenally rapid

Fig. 112. Common wild or Virginian strawberry.

amelioration, obscured the native species, however, and the latter are now practically out of cultivation. Now and then some evidence of native blood can be seen in an early variety, but the influence of our

field strawberry in the improvement of the garden varieties has evidently been very small.

A full discussion of this strawberry evolution is made in Essay XXV., "Survival of the Unlike," and it is, therefore, unnecessary to pursue the subject here.



Fig. 113. Plant of the common wild strawberry, showing how the runners form before the fruit is matured.

It may be said, however, that there are three leading groups or types of strawberries native to North America,—the Scarlet or Virginian group, the Vesca or Old

World group, and the Chilian or Pacific group. All these groups are perplexingly variable.

The Virginian strawberry is the common field and meadow strawberry of the eastern states. It has received many names from botanists, the oldest being *Fragaria Virginiana* of Duchesne (1766). Its features are clearly depicted in Figs. 112, 113 and 114,—the bluntish-toothed, thickish leaflets overtopping the flowers, the small drooping-rayed fruit truss, and the globular-pitted berry. On mountains and along our northern borders and in Canada, the plant becomes squat, and this form was called *Fragaria Canadensis* by Michaux. I have seen Michaux's specimens in his herbarium at Paris (from Lake Mistassinica), and they look distinct enough from the field strawberry of lower latitudes and altitudes; but it is doubtful if it is worth while to keep them apart as distinct species. William B. Prince, the Long Island nurseryman, proposed two large prairie forms of the strawberry as distinct species in 1862 (Proc. Amer. Pom. Soc. viii. 206), naming them *Fragaria Iowensis* and *F. Illinoensis*. The latter name has since been used for the larger-growing forms of the species, as *Fragaria Virginiana* var. *Illinoensis*.

Fig. 114. Fruit of Virginian strawberry. Natural size.

The native strawberry of Europe is characterized by thin, light green, and sharp-toothed leaflets, which are overtopped by the flowers, by a small and weak truss, and a more or less elongated berry with the seeds not imbedded in the flesh. This type of strawberry is also common in the northernmost states and Canada, and throughout our mountain systems. There is some

doubt as to whether the American plant is closely enough like the European to warrant one in calling it the same species. Until very recent years it has been known by the name of the European plant, *Fragaria*

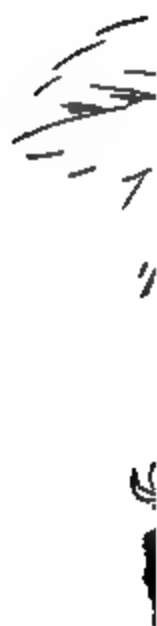


Fig. 11
Fragaria americana.
Natural size.

Fragaria Americana.

vesca, but Professor Porter now proposes to call it *Fragaria Americana*. The Cordilleran form of it has been known as *Fragaria Mexicana*. The characters of the plant are well shown in Figs. 115 and 116. There are white-fruited forms. *Fragaria Americana* has never been ameliorated by the plant-breeder, and it has less

Fig. 117. *Fragaria Chiloensis* from Oregon, after having been grown one year in New York. The runners form mostly after the fruit is gone.

promise than the other types of native strawberries.*

The Chilian strawberry (*Fragaria Chiloensis*), from which the garden berries have come, is also native to the Pacific coast region of North America; and outly-

**Fragaria bracteata* is a New Mexican species described by A. Heller since this book went to press (Bull. Torr. Bot. Club, xxv. 194). It is also reported from Idaho. It is allied to *F. Americana*.

Fig. 118. Truss of *Fragaria Chiloensis*.

ing forms of this type are known as *Fragaria Californica* and *F. glauca*. Figs. 117 and 118 show some of its characteristics,—the thick, blunt-toothed leaflets, low fruit-clusters with sprawling-rayed trusses, and conical-pitted berries. It is possible that useful varieties may be obtained from this North American Chiloensis group, although the garden progeny of its South American branch is already so good that there is little reason for returning to the wild for a new start.

VIII

VARIOUS TYPES OF TREE FRUITS

THERE are great numbers of trees in North America, small and large, which produce edible fruit, some of which must come to be the parents of important fruit-bearing races. Of a few of these, something has already been done towards domestication; and the most important of these may be mentioned.

The Persimmon

We have already seen (page 172) that the wild persimmons attracted the attention of the explorers and colonists, by many of whom they were called plums. Over a hundred years ago, experiments were detailed for the utilization of this fruit in the making of wine,* and the fruit is still employed in parts of the South in the manufacture of domestic liquors. Perhaps there is no native fruit which is more variable than the persimmon. It is not improbable that more than one species is passing under the name of *Diospyros Virginiana*. This at once argues that the persimmon is capable of rapid amelioration. Several extra good forms have been transferred to cultivated grounds and have received names. Troop and Hadley's bulletin,† which is the best literature yet made

*Isaac Bartram, "A memoir on the distillation of persimmons," in Trans. Amer. Phil. Soc. i. 301 (1789).

†"The American Persimmon," Bull. 60, Indiana Exp. Sta. (Apr. 1896).

on the subject, describes eight of these varieties,—Shoto, Early Bearing, Golden Gem, Daniel Boone, Hicks, Kansas, Smeech, Early Golden. These writers speak as follows of the prospective merits of the species :

The native persimmon, or date plum, is one of our neglected wild fruits which has heretofore received but little attention from the fruit-growers of this country, although it possesses many desirable qualities which, when brought to a higher state of perfection by selection and cross-fertilization, will certainly cause it to be more highly appreciated by all lovers of good fruit. But little literature is to be found on the subject, and so the general public is quite ignorant concerning its real merits. The fruit is scarcely known except by those who live in sections of the country where it grows wild, and even in these localities, but little attention has been given to its cultivation.

From recent personal investigations, we have found the persimmon growing wild in many portions of the southern half of this state, and producing, in some instances, a fruit of excellent quality and in great abundance; and yet so little attention is given to it by the farmers in these localities that hundreds of bushels of fruit are annually allowed to waste on the ground. There are various reasons why this fruit has been hitherto neglected. One is the exceedingly astringent or puckery principle which the green fruit contains, and which remains with most wild varieties until thoroughly ripe, some never losing it entirely. Again, in most instances, where cultivation has been attempted, suckers or seedlings have been used for planting, and these generally die, or if they live, produce inferior fruit, or prove to be sterile. Another discouraging feature was that it required a long time for the trees to come into bearing. But a new condition of things is being brought about, so that these difficulties will soon be largely removed. New methods of propagation and cultivation are being introduced in its culture, so that now trees frequently begin bearing at from three to five years from the bud or graft, and we believe that this fruit is capable of being improved to such an extent as to make it equal to that of some of the Japanese varieties.

Until recently there were no well defined varieties under cultivation. We have found, however, many well-marked varieties growing wild. They differ in quality as much as our cultivated apples. Some are very astringent, others are insipid and worthless, while still others are sweet and delicious. Almost every tree is a variety of itself, as the persimmon, like the apple, does not reproduce itself from seed with certainty. In the wild state it is sometimes found growing in clusters of ten or a dozen trees, and all apparently of the same variety, but these probably came from the roots of the original or parent tree. The fruit differs in size from that of a small wild plum to that of the large cultivated kinds, an inch and a-half to two inches in diameter. They also vary greatly in form: some are globular, others either conical or oblong, those of the globular form predominating.

The persimmon is readily propagated from seeds, which should be procured in the fall or early winter, and planted in the same manner as peach pits. The young seedlings will often attain a height of over two feet the first season. These seedlings, especially from cultivated varieties, cannot be depended upon to reproduce themselves. In fact, this fruit varies greatly in the wild state. Twenty trees raised from the seeds of one parent tree may produce twenty distinct varieties; we must therefore resort to budding or grafting the young stocks with buds or cions from the variety which we desire to propagate. A desirable seedling variety may be multiplied by breaking up the roots of the parent tree, thus causing it to throw up sprouts or suckers. These, however, are difficult to transplant successfully, owing to a deficiency of root development.

The following extracts from a letter from Eli H. Chandler, Marietta, Ga., show how variable the persimmon is:

In northern Delaware some thirty years ago were two trees (the only ones in the neighborhood) whose fruit myself and brothers highly esteemed. Six miles from there was a grove of persimmon trees equally desirable from a fruit standpoint, and I knew of a very few isolated trees in Chester and Delaware counties, Pennsylvania. On none of these trees was the fruit

ripe until after very heavy frosts, and we usually gathered it after the first snow storm. The trees bore biennially, and were at least eight to ten years old before they came into bearing.

In eastern Kansas (Wyandotte and Bourbon counties, particularly), and generally in western Missouri, I have gathered an abundance of good persimmons, always after heavy frosts. The trees in that section bore at an earlier age than in the East, but otherwise I could see no difference between the fruits of those and the eastern trees, except that the eastern trees were on uplands, and those in the West mostly on low lands.

Here, in Georgia, the conditions are different. The trees grow everywhere, bear immense crops biennially, and ripen from September 1 to February 1; that is, we have trees whose fruits ripen early, and others that are not fit to eat until after frost; some not good at all. I ate my first persimmons this season September 1, and three weeks afterwards the fruit on that tree was all gone. I had very fair persimmons January 15, from trees whose fruits were unfit to eat December 15. I know of three small trees (in a clump) some fifty miles from here, whose earliest fruits ripen in October, and the latest can be kept until December 20. The fruits are as large as a small Mandarin orange, three to five seeds, sweet, melting and juicy, no pungency whatever, and comparable in lusciousness with a ripe Seckel pear. I have hunted over hundreds of square miles and examined thousands of persimmon trees, but have never found the equal of these fruits for size, early and continuous ripening and lusciousness, nor have I seen anything anywhere to compare with them in size, and only one tree whose fruits are as fine-flavored. I esteem them more highly than the Japanese persimmon as it is produced here. They are superior in every way except in size.

What we call (in the family) the "premium tree" is growing about three miles from here, and we have been making weekly visits to it from early in October until late in December. The fruit from this tree is about the size of a small black walnut, deep yellow with a blush on the sunny side, a down or bloom similar to some plums; sweet, juicy, rich, melting, with no pungency, and mostly only three seeds.

Some trees here bear fruits no larger than a good-sized cherry. On some the outer skin turns black when the fruit is

ripe; these are the last to ripen. Some are dry and sugary when ripe, and many are always puckery. Saplings three feet high are loaded with fruit, and the largest trees reach thirty feet.

The natives seem to care little for them; even the negroes

Fig. 119. Shimo-Shiradzu, a kaki. Natural size.

scarcely eat them, but do make them into "'simmon beer." I have come in contact with natives in the mountains who did not know they were fit to eat. I believe that a plantation of carefully selected trees, properly cared for and marketed in the best season, would be a paying investment.

The Japanese persimmon, or kaki, has been brought

to a high degree of perfection, the fruit being eaten from the hand, in various culinary preparations, and as a dried fig-like conserve. The kaki has been introduced to this country, and is already establishing a reputation in the better markets. This noble fruit has called attention anew to the native persimmon, and particularly so since the foreigner will not thrive north of Washington, whereas the native will often fruit as far north as Massachusetts. It is very probable that the two species will hybridize, and that the amalgamation will give something of distinct value. But even if hybrids are not obtained, the native species is capable of great direct improvement. Figs. 119 and 120 (from Georgeson, in "American Garden") show two average varieties of the kaki; and when Figs. 121 and 122 are compared with them, it will be seen that the chance for improvement is great.

The following sketch of the effect of cultivation on the persimmon was contributed to "American Garden" in 1892, by J. W. B., Queens county, N. Y.:

The native persimmon varies much in its habit of growth and in its general characteristics, according to locality, nutrition or exposure. In New Jersey and the north of Pennsylvania and Ohio it is scarcely more than a tree-like shrub, while in the bottom-lands of Virginia and the Carolinas it frequently rises to a shapely tree forty feet high, covered with fruit which is dear to the heart of every southern boy in spite of its intense astringency, which, in its green state, is like concentrated tannic acid. This is gradually lost as the fruit ripens, giving place to a mild, rich sweetness of pulp, which to some persons is very agreeable. Still, the persimmon, in its wild state, is not a general favorite. It is eaten in the South chiefly by the omnivorous small boy and by the 'coon and 'possum. Sometimes, also, it is mashed into a cake with cornmeal, and dried for the brewing of what is known among the "crackers" of Carolina as "'simmon beer."

**Fig. 120. Haku-Gaki, a kaki or Japanese persimmon. Natural size.
This and Fig. 119 are from Japanese drawings.**

The capacity for improvement, however, of the American persimmon by cultivation is beyond question. Fifteen years ago I had some correspondence with the poet Bryant (whose zeal as a cultivator, and whose interest in fruit-growing were almost as great as his poetic enthusiasm) on the subject of the improvement of our native fruits by high cultivation. Mr. Bryant often insisted that the time would come when this would become one of the popular and marketable fruits of the middle states. He gathered specimens and varieties of the *Diospyros Virginiana* from all parts of the South and West, and cultivated them most carefully, and his pleasant old home at Roslyn will doubtless

Fig. 121. A wild persimmon. Natural size.

show to-day some relics of his ingenious care in the laying out and arrangement of his experimental plantations.

Mr. Bryant decided, after many years of experiment with the persimmon, that the finest and most vigorous varieties were those grown in the alluvial meadows of southern Indiana; and he sent me some specimens, from one of which, by high fertilization and root-pruning, I have from year to year gathered fruit of greatly improved size and flavor. I enclose a rude sketch (Fig. 122) of one specimen of this year's fruit from one of the trees received from Mr. Bryant. The smaller drawing (Fig. 121) shows the wild fruit, which has received no special care, gathered from another tree.

As I have already said, the astringency of the fruit is much diminished by cultivation, while the flavor is improved; and, as

in the Japanese persimmon kaki, the pulp becomes more abundant, and the seeds are reduced in number from five in the wild state to two or even one, and often quite disappear, and the fruit becomes absolutely seedless.

The persimmon is an ornamental tree, shapely and sym-

Fig. 122. Native persimmon, cultivated. Natural size.

metrical in form; its bark and leaves are distinctive, and its wood is dense and heavy. It grows readily but slowly from seeds, is a gross feeder, and with good cultivation and care, will produce fruit in its sixth year. It is perfectly hardy as far north as Hartford, Conn., and will bear fruit on Long Island from year to year without interruption.

The Custard-Apple Tribe

In the tropics, the various custard-apples (anonas and their kin) are much esteemed, and some of them are grown in extreme southern Florida. We have only one native species. This is the pond-apple of

southern Florida, known to botanists as *Anona glabra* (or *A. laurifolia*). It is a small tree, sometimes reaching the height of thirty or forty feet. It is a

Fig. 123. The Pond apple. *Anona glabra*.

striking tree as it grows about the borders of the everglades, its roots lying under the water. A fruit is shown natural size, in section, in Fig. 123. It is

oblong-conical, three to five inches long and two or three inches broad, light yellow and becoming brown-blotched, with many large, transverse seeds. The fruit is esteemed by the Indians, and it has been mentioned as worthy of domestication, but although aromatic it is insipid, and is not likely to attract consumers. The fruit ripens in November.

Of the asiminas, or so-called pawpaws,—which are also anonaceous plants,—there are several species in the United States. One of these, the northern pawpaw (*Asimina triloba*) bears large and comestible fruits, although most people do not relish the flavor. Typical fruits are shown in Fig. 124. One or two named varieties have been offered for sale. The plant is eminently worthy of cultivation for its ornamental qualities, but it is doubtful if we are to expect much interest to be awakened in its fruit.

The Thorn-Apples

The genus *cratægus* is very closely allied to the apples and pears, and it is rich in American species. Several of these thorn-apples produce fruit of great beauty, and some of the fruits are pulpy and edible, and are esteemed in various localities. As long ago as 1838, the Downings wrote of one of these thorns as follows:* "Mr. Longworth, of Cincinnati, one of the most distinguished horticulturists of the West, writes us, in a recent communication, that he discovered, in the interior of Ohio twenty-five years ago, a variety of haw, with fruit the size of a crab-apple, having a delicious flavor. He has lately re-

*Hovey's Mag. Hort. 1838, 46.

Fig. 124. The Northern pawpaw, *Asimina triloba*. Nearly natural size.

discovered it, and has kindly promised to forward us some grafts. Should it prove as fine as he anticipates, it will be quite an addition to our fruits, as it is probably very beautiful in appearance."

None of these native thorns has been widely advertised or sold except *Crataegus cordata*, the Washington thorn (Fig. 125), and this is known for hedges and ornament rather than for fruit. It is native in Kentucky and southern Illinois and southward, but is hardy in central New York. It has long been known in Europe. It is a beautiful tree, sometimes reaching a height of thirty feet, and bearing freely of bright red apple-like and pleasant-tasted fruits.

The Nut-Fruits

North America is peculiarly rich in its nuts. The reader will recall the chestnuts, many kinds of hickories, walnuts, butternut, hazels, beechnut, nut pines, and sweet acorns. Of all these types, only one species has yet reached great commercial importance. This is the pecan, which is a species of hickory. The second place in the progress of ameliorated native nuts is taken by the chestnut. Beyond these, there are no species which have attained to general importance in cultivation, although there are several named varieties of the shellbark hickories and the black walnut. The interest in this class of fruits is great, however; in fact, it is probably greater than the commercial importance of the subject warrants, for nuts are very secondary articles of commerce and, not being perishable, they can be shipped any distance, or even kept from year to year. The excellent special litera-

Fig. 125. Washington thorn. *Ostrya cordata*. Half size.

ture on the subject obviates any necessity of discussing the subject in detail in this place. The reader should consult Fuller's "Nut Culturist," and the exhaustive quarto report by the United States Department of Agriculture on "Nut Culture in the United States." For chestnuts, the reader may also consult Buckhout, "Chestnut Culture for Profit," Bull. 36, Pennsylvania Experiment Station; and, for a sketch of the botany of the subject, Sargent's great "Silva" (which discusses the other nut trees also), and Bailey in "American Garden," May, 1891.

IX

GENERAL REMARKS ON THE IMPROVEMENT OF OUR NATIVE FRUITS*

HAVING thus seen what has actually been accomplished in the amelioration of fruits which are native to this country, we may now take a general survey of the status of the subject and of the means by which the evolution has been accomplished.

The chief reason for supposing that the native fruits should be domesticated seems to be the most obvious fact that they have merit in themselves; and yet, paradoxical as it may seem, I imagine that this is not sufficient reason to recommend their amelioration. It is not the thing which is intrinsically the best which necessarily deserves the most attention, but the thing which is most needed. We shall find our most helpful suggestions from a reflection on what has been accomplished and how it has been done, rather than from a mere objective study of the kinds of our wild fruits. I propose, therefore, to divide this essay into two parts,—what has been done, and what probably should be done.

What Has Been Done

The most obvious truth which strikes one when he attempts to make a reflective or historical study of

* Reprint, with minor modifications, of a paper contributed by the author to the Yearbook of the United States Department of Agriculture for 1896.

the improvement of our native fruits, is the fact that in nearly every case the amelioration has come from the force of circumstances and not from the choice or design of men. Let me be specific. The colonists—in common with other good people—knew and loved wine. The beverage has been a hand to hand—or more truthfully a hand to mouth—companion of the human family from the first. The attempt was therefore early and heroically made to grow the European or wine grape in eastern America; but the attempt failed. In sheer distress of failure, the grape-grower was driven to the use of the native grape. How literally true this was the reader may learn by reading the history of the grape colony of the Dufours in Kentucky and then in Indiana late in the last century and early in this, and noting the fact that the existence of the colony, as such, depended upon the success of the wine. The salvation of the colony was the Alexander or Cape grape, which, in a most surreptitious way, had transferred itself from the wild into plantations which were at first designed to grow the European varieties; and later on, John Adlum's famous Catawba, a product of the Carolina highlands, added the crowning glory and success to the experiment, and thence spread itself along the Ohio and over the Union. And yet, while the Alexander and the Catawba were driving out the Old World types, the grape-growers were at the very time making a most determined opposition to native grapes. The fact is that the native grapes—the types which we now cultivate—came into domestication in spite of us.

The native plums—of which two hundred or more horticultural varieties are now described—came into

domestication because the Old World plums, with which we are chiefly familiar in the northeastern states, will not thrive in the prairie states and the South. The cultivated native plums had been widely disseminated before horticultural annalists discovered the fact; and there is no evidence that the early introducers of them had any suspicion that they were making history when they planted them. These plums were, no doubt, looked upon as a makeshift in a new country,—as a fruit which was better than none when good ones could not be had.

The reason why the native raspberries came into cultivation was because the European species is tender in our climate, and demands too much care and petting. The native types of gooseberries drove out the foreign ones because the latter are injuriously infested with the mildew. The native crabs are now demanding attention where the climate is so severe that the cultivated apple cannot thrive. The wild red mulberry has been improved because the Old World black mulberry is tender, and we have been so ignorant of the fact that we have all along supposed that these natives are forms of the Old World species. The Chilian strawberry—the foundation stock of our commercial varieties—brought itself into domestication while men were bent upon impressing the Virginian berry into service; and most of our writers still insist upon calling the common garden strawberries descendants of the latter species, so ignorant are they of the true course of the evolution.

The obverse of this picture is likewise instructive in showing how difficult it is to introduce and to improve fruits which are not forced upon us. For a

century and more, the native nuts have attracted the attention of economic writers. Their merits for food have been praised without stint for years. Two excellent books have been written about them. Yet they have made very little progress towards amelioration. The simple reason is that we have not been pressed by any necessity to grow them. No nuts are staple articles of food among the peoples who have chiefly settled the United States. They are essentially subsidiary and incidental features in our lives. So, while we all like hickory nuts and walnuts and the like, we are nevertheless not impelled by any overmastering necessity to gather the trees into the garden or the orchard. We associate them more with the woods and the landscape and the outings, than we do with the kitchen and the larder. They have no conspicuous places in our heritage of customs and associations, as the apples and grapes and berries have.

Much the same observation can be made respecting the native huckleberries, fruits which have been recommended time and again as proper subjects for amelioration, and yet practically nothing has been done towards their improvement. The chief reason of this neglect is, it seems to me, that the imperative needs which the huckleberries may be supposed to satisfy, are already supplied in large measure by other berry-like fruits.

There are apparent exceptions to all this in the cranberry and blackberry, for neither of these fruits had ever been an important food for the human race. Yet the very abundance of these fruits, and their adaptability to the common needs of life, forced them upon the attention of the settlers and colonists, who

were often pressed for food. It was but natural that, as the wild areas of the fruits became restricted, attempts should have been made to grow the plants.

The minor small fruits which have recently come into notice from the West have been impressed into domestication chiefly because of the comparative scarcity of domestic fruits in the regions from whence they come. Some of these are the buffalo-berry, the dwarf juneberry, the Crandall currant type, and the dwarf cherries and dwarf plums.

Whereas the fact has been that the reigning types of improved native fruits have come into cultivation largely as a result of the force of conditions rather than as a direct or designed choice on the part of men, it nevertheless does not follow that intelligent choice of species has not played an important part in the evolution, and that it may not count for much more in the years to come. Yet the student should bear in mind the fact that all the most needful types of native fruits have now been impressed into cultivation, and that those which yet remain in an almost wholly untutored condition,—as many of the nuts, the elderberries, the asimina, and others—will come into cultivation, if at all, only through the expenditure of great effort to make their merits and possibilities known. From now on, the attempt to introduce new types of native fruits must be, broadly speaking, a forced effort. But if this is true, it does not follow that our efforts at amelioration should cease, but rather that the most promising and the most useful expenditure of energy is to be found in still further improving the species which are already thoroughly established in cultivation, for none of

these types are yet—and, in fact, never will be—brought to that condition when they may be said to be good enough. This conclusion, while apparently the only logical one, does not seem to have been reached by writers on the improvement of our native fruits. The tendency of writers has always been, unfortunately, to press the importance of undeveloped species, forgetting that the really important things are the ones which we already have, and all of which are far from perfect. The whole question, then, is simply that of the best methods of improving fruits, without respect to their nativities.

Having now seen that new types of plants are impressed into cultivation largely because they are needed, and in an undesigned or almost fortuitous way, let us ask how these particular domestic fruits which are native to North America have been ameliorated. The process has been a most simple one: attractive varieties, or forms, have been found and men have transferred them to the garden. This, in essence, has been the method of the amelioration of most domestic plants. It is first a discovery of a good form, and then the perpetuation of it. What has been called plant-breeding is mostly discovery; or, in other words, so far as the cultivator is concerned, it is accident.* In one place, an attractive wild blackberry

*These remarks concerning the accidental origin of varieties call out the following significant comment from Frank T. Swett, Contra Costa county, California: "While chance seedlings spring up in fence corners and similar places in countries where there are summer rains, it is a rare occurrence in arid regions. This was brought to my notice forcibly this spring. In May and June our vineyard was filled with tens of thousands of little grape seedlings, an inch or two high. They never grew much higher, and by July they had all perished. It is the same in our orchards. The five months of drought are too much for any seedling fruit, unless it is irrigated. As similar conditions of summer drought are prevalent over Arizona, New Mexico, and parts of Texas, it is hardly probable that many chance seedling varieties will originate within those limits."

is found. The bush is taken to the garden and it is called—after the name of the town—the Dorchester. In another place, another form is discovered, and this, when transplanted, becomes known as the Lawton or New Rochelle. Another form is found on a prairie, and is called Western Triumph. Now and then one comes up about an old plantation, and is similarly cared for; and rarely a man sows seeds and picks out a good variety from the seedlings; and very rarely a man keeps a record of the parentage of the seed he sows; and very, very rarely one makes crosses and sows the seeds therefrom.

But while the new varieties are mostly discoveries, it does not follow that there is no skill represented in these novelties. The skill is shown in the recognition of a good thing, in giving the plants the very best of care when once they have been transferred to the garden; and the force of this domestication is likely to express itself in better or more tractable offspring in each generation. The tendency towards betterment is constantly augmented by the habitual selection of the best new forms. The tendency could be much more rapidly hastened if, in addition to selecting the best seedlings which chance to appear, the operator should also select the seeds from the best plants with which to raise the seedlings.

The reader may now want a specific account of just how a few prominent varieties of native fruits have originated. The old Cape or Alexander grape, which first introduced a successful viticulture into eastern America, was found wild in the woods in Pennsylvania, as we have seen. The Catawba, which is still a popular commercial variety, was found in

the woods in South Carolina in 1802. There are, no doubt, as good forms of the native fox-grape in the woods now as there were then, but we have now obtained a start in grape-growing, and we are no longer looking to the wild for our varieties. The fox-grape is known to be widely variable in its wild state, and I have this year obtained no less than half a dozen types of large and handsome wild fruits of it, varying from deep purple to amber-red. The Concord was a chance seedling in a Massachusetts garden, and it is supposed to have sprung from the wild fox-grape of the neighborhood. The Worden was raised from a seed of the Concord. The Delaware was found in the garden of a Frenchman in New Jersey, about fifty years ago, but its genesis is wholly unknown. It is probably a product of an accidental cross between the European grape—which the Frenchman cultivated—and some variety of native grape. The Brighton is the product of a hand cross between the Concord and the Diana-Hamburg (the latter itself a hybrid) by Jacob Moore, then of Brighton, N. Y. The Diana, which was a prominent variety for many years, was grown from a Catawba seed in Milton, Mass. Moore's Early was grown from a seed of the Concord. The Clinton came up where a handful of grape seed was sown at Hamilton College, Clinton, N. Y., and the old vine, now about seventy-five years old, is still growing on College Hill. The Norton's Virginia was found wild in 1835, near Richmond, Va. The Isabella was brought into the North early in the century. Its origin is wholly unknown, and has been the subject of much speculation. The botanical evidence shows that it is probably a native form of the fox-grape. All

these specific illustrations of the origins of varieties are fairly typical for all native fruits. Most of the forms are random or chance discoveries, and they show that the natural tendency towards progressive variation in the indigenous fruit-species must be great, 'else the domesticated forms could not have reached their present state. If so much has been done by mere chance,—so far as the horticulturist is concerned,—there is certainly reason for believing that the rewards of plant-breeding must some day be great.

What Probably Should be Done

What has been done need not be done over again. That is, the best results at the amelioration of any species are to be expected by working with the highly improved forms rather than with the original wild stock. The quickest response to the plant-breeder is to be expected in those species which are already most ameliorated, and it is in these species, also, that the greatest efforts are needed, because they are the species which have the most useful qualities for man. One cannot specify how the native fruits may be improved without going into the whole subject of the amelioration of plants (a discussion of which I have already made in my "Plant-Breeding"); but it may be useful to designate some of the things which seem to need to be done.

In the first place, we need more varieties of every native fruit now cultivated—of grapes, raspberries, plums, cranberries, and the others. This is because new needs are always arising and the fruits are being grown in new regions, and new varieties are needed

to adapt the species to these new wants. Those persons who are looking for the coming of the perfect, all-round variety, are behind the time, and are constantly getting farther behind, for it is more and more impossible to combine all the varied and contradictory specific desires of men into one plant form. There must be a best variety for every particular use and locality and soil. The cosmopolitan variety must become more and more restricted in range and usefulness as time goes on, and as more refined and specific needs arise. People are always saying that we already have too many varieties and the effort is always making to reduce the number. Even the experimenters in the stations usually conceive it to be a part of their duty to endeavor to reduce the number of varieties, but what they are really doing—or might be doing—is determining the merits of varieties for specific uses. If a given variety does not satisfy the ideal of the experimenter, that fact is no proof that it may not satisfy the ideal of some one else, or that it may not be a positive acquisition in some other place or for some other purpose. We shall always need to test varieties, to be sure, and the testing must be more exact and personal the more critical we become in our demands. It is out of the many new varieties that we shall find the particular ones which we ourselves desire.

In the second place, we need a greater range of variation,—more divergent and widely unlike varieties. These can be had by selecting out of the annually recurring batches of new varieties those which are widest unlike the existing types, providing, of course, they are worthy to be perpetuated. But they can be

most surely obtained by raising seedlings from the most unlike types, and by the crossing of various types.

In the third place, we need to secure more incidental or minor strains of the most popular and cosmopolitan varieties. The Concord grape, for example, is a most virile and useful type, and minor varieties of it—even if they were still called Concord—might adapt the variety more completely to some particular purpose or locality. In many districts, for example, a Concord a week earlier or a week later than the standard variety, might be more useful than a variety wholly new in kind. I introduce this class of facts to show that, while we need more varied types in our native fruits, we also need to increase the usefulness of regnant types by inducing secondary variations in them. There are two means of securing these minor variations. The surest means is to take cuttings or buds from those particular plants in our plantation which most nearly fit our purposes. In almost every large Concord vineyard, for example, there are some vines which are earlier or later, more or less productive, or otherwise different from the type. In many cases, the cuttings will perpetuate these differences. The second means of securing these incidental forms is by crossing between plants of the same variety. I am convinced that this type of plant-breeding is, in general, quite as useful as that of crossing unlike varieties; and after a wide range of variation has been secured and when men's ideals have become critical through education and business competition, it will be the more promising field.

In the fourth place, it should be said that the

greatest effort should be made to preserve or to intensify those desirable attributes which are characteristics of the wild species. Such attributes are likely to be more virile and permanent than similar ones which originate under domestication, because they have been impressed upon the species for a longer period of time. The intending plant-breeder can save himself much time and strength by throwing his efforts into line with the direction of evolution of the species rather than against it. He cannot afford even to be indifferent to the natural capabilities of the type. For example, other things being equal, the domesticator will generally have better results in breeding plants for a dry region by selecting those types which naturally grow in such regions. The adapting of the grape to limestone soils can no doubt be quicker accomplished by endeavoring to breed up acceptable varieties from *Vitis Berlandieri*, which thrives in these lands, than by attempting to overcome the pronounced antipathies of the *Vitis Labrusca* types to such soils. The first attempt, in impressing new fruit-species into cultivation, should be to secure a type which will thrive in the given region; the production of ameliorated varieties is a secondary and usually much simpler matter. The first consideration in breeding plums for the dry plains regions, for example, is to secure a type which will endure the climate,—the long droughts, the severe winters, the hot summers. This fundamental desideratum may be expected to be found in the indigenous plums, rather than in the domesticated types. This is saying that one of the most promising lines of effort in the improvement of the native fruits is to work with the

species which are indigenous to the locality, if they possess coveted features and if they are naturally variable.

All this means, what I have already said, that there should be a general improvement all along the line in our native fruits, the same as there should be in any other fruits; and the greatest improvement is needed in those very types which are already most improved. In other words, we need more to augment the amelioration of types already domesticated, than we do to introduce wholly new types, although this latter enterprise is also of great importance. The new types may be expected to come into use as the demand for them arises, and they will come in gradually, and obscurely at first, as the other types have come.

The grape, in my estimation, needs the first and the greatest attention. The types which we grow are yet much inferior to the Old World types. Our commercial varieties—as the Concord, Worden, Catawba, Niagara, Norton's Virginia—are generalized types, and the market is now overrun with general-purpose grapes. We shall soon be driven into specializations in grapes, as people have been in older countries, and special varieties will then be needed. Aside from the further improvement of the domesticated native species, we are now being driven—by the settlement of the South and West—to the improvement of other species, like *Vitis Linsecomii*, *Vitis Champini*, and the like. The second greatest need is in the development of our native plum flora; the third is in the further evolution of the brambles, as the raspberries, blackberries and dewberries; the fourth is in the amalga-

mation of the western crabs with the domestic apples, for the plains and the northwest. Beyond these four emphatic needs, I think that there are none which stand out clearly and unmistakably above all others, although there are a score of native fruit-types which are crying for attention. Among them may be mentioned the chestnuts, pecans, gooseberries, currants, cranberries, huckleberries, juneberries, cherries, mulberries, elderberries, and all the tribes of hickory nuts and walnuts.

The stimulus, or *raison d'être*, of the improvement of native fruits will be the increasing demands made by a complex civilization; and the actual work of improvement will be done by a few patient souls whose love of the work far outruns desire for applause and for pecuniary reward.

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